Information Management Plan for Monitoring the Estuarine Waters of the Carolinian Province: Year One

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Table of Contents

1.0 Introduction

1.1 Overview

This Information Management Plan is based on a pragmatic approach to getting an information management system (IMS) for the Carolinian Province Office (CPO) in place in time to accommodate the startup of a full demonstration project during the summer 1994 sampling season. The plan is designed for rapid implementation with a simple DOS/Windows and SAS-based system running initially on personal computers (throughout the summer 1994 sampling period). This near-term solution is aimed at the capture and processing of high-quality data with a minimal infrastructure in place prior to this point in the program. In the fall of 1994, the PC-based system will be linked directly to an IBM RISC 6000 computer with a UNIX operating system (maintained by the South Carolina Marine Resources Research Institute, where the CPO is co-located) to allow additional high-end computing and to enhance our communication capabilities via direct access to the Internet. Long-term plans also include a shift from SAS to ORACLE as a data management tool as in other EMAP provinces.

The EMAP-Estuaries Information Management Plan (Rosen et al. 1992) was used extensively as a basis for preparing the present information management plan for the Carolinian Province. The goals and general approaches included in the Carolinian plan are also consistent with those of the national EMAP Information Management Strategic Plan (Shepanek 1994).

1.2 EPA/NOAA Joint Coastal Monitoring Program in the Carolinian Province

The National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) have recently agreed to establish a joint national program of coastal research and monitoring beginning with activities in the southeast. Authority for this partnership is provided under the "National Coastal Monitoring Act," Title V of the 1992 Amendments to the Marine Protection, Research, and Sanctuaries Act, which encourages NOAA, EPA and other Federal agencies to establish a comprehensive national program for consistent monitoring of the Nation's coastal environment and ecosystems.

The combined NOAA/EPA effort merges sampling philosophies and data products of both EPA's Environmental Monitoring and Assessment Program (EMAP) and NOAA's National Status and Trends Program (NS&T). Benefits of merging the two programs include preventing duplications of effort and building stronger complementary data sets.

EMAP is a nationwide environmental monitoring and assessment program designed to provide information to evaluate the overall health of a variety of coastal and terrestrial ecosystems. EMAP incorporates a long-term monitoring approach to assess how resource conditions are changing with time and to evaluate the effectiveness of pollution prevention measures. EMAP monitoring also is based on a random sampling design, which allows probability-based estimates of the extent and magnitude of degraded ecosystems. EMAP is designed to look at ecosystem health on broad regional scales. Demonstration projects in estuaries were initiated in the northeast's Virginian Province (Cape Cod, MA to Cape May, VA) in 1990 and in the Louisianian Province (Gulf of Mexico) in 1991.

NS&T also is a nationwide coastal monitoring program. NS&T is based on a fixed-station sampling design, which enables one to follow trends in conditions at a given site and to focus sampling efforts in specific areas of interest, such as near urban centers or in depositional environments where contaminants are likely to accumulate. Since 1984, NS&T has been monitoring more than 70 organic chemicals and metals in sediments and biota at more than 300 sampling sites in U.S. coastal waters. There are about 20 NS&T sites in the southeast region. In 1986, NS&T initiated intensive bioeffects surveys to investigate the effects of chemical contamination on coastal organisms in areas determined to have persistently high levels of one or more contaminants. Such a survey was conducted in Charleston Harbor in 1993.

The joint EMAP/NS&T program in the Carolinian Province, which extends from Cape Henry, Virginia to the Indian River Lagoon system in Florida, began as a pilot study in the summer of 1993 and will continue as a full Demonstration Project in the summers of 1994 and 1995 (and possibly beyond). As a result of the joint monitoring effort, site-specific data from the fixed-station design of NS&T may be merged with the probability-based data derived from the EMAP random-sampling design.

For 1994 the core field program will consist of monitoring at a total of 84 randomly selected sites. Twenty of these sites are in large estuaries (surface area > 260 km^2 and length/width aspect ratio < 20), 17 are in large tidal rivers (surface area > 260 km^2 and length/width > 20), and 47 are in small estuaries (surface area 2.6-260 km^2). A new set of stations will be selected in each of the subsequent years. At each of the sites, synoptic measurements are made of a variety of chemical/physical, toxicological, and biological variables as indicators of pollutant exposure, natural habitat conditions, and biological responses. Research to develop and test additional indicators will supplement the core program. Such studies will include the development of alternative bioassays based on sensitive sublethal biological endpoints, sediment bioassays with alternative test species, and indicators of tidal wetland functional quality.

Another special aspect of the management approach for the Carolinian Program is that monitoring and research activities are being implemented through Cooperative Agreements with State research laboratories and universities. Benefits of this approach include participation of scientists with strong regional expertise, the ability to integrate the core NOAA/EPA program with other State monitoring and research studies, and sharing of research costs. Overall, it is anticipated that such a cooperative approach will lead to a greater amount of science from the combined efforts, and thus enhance the basis for fulfilling the overall CPO objective of assessing the status and trends in ecological conditions of southeastern estuaries.

1.3 Need for an Information Management System

The success of the joint EMAP/NS&T coastal monitoring program in the Carolinian Province will depend, to a large degree, on the ability to manage and disseminate an enormous amount of information to personnel at many different technical levels and physical locations. Information must be tracked carefully from the point of sample collection through data analysis and interpretation. Information derived from the program must be made available to scientists, administrators and the general public in meaningful and reliable forms and in compliance with strict quality-assurance guidelines. Data and information generated by related projects also must be incorporated into the EMAP information system with similar levels of quality.

All data on sampling activities, field measurements and observations, and results of laboratory analyses must be recorded and tracked. In addition, samples will be shipped to various laboratories for further processing and the shipments must be tracked as they proceed from one location to another. Data sheets, diskettes, and equipment also must be tracked. Further details of the samples that will be collected, the methods used, and handling requirements can be found in Kokkinakis et al. (1994a).

The data will be used for a wide variety of analyses and interpretations. Analyses will range from tabular summaries and statistical comparisons to evaluations of spatial distributions using Geographical Information Systems. An established goal of the overall EMAP Estuaries program is the publication of statistical summaries within nine months after the completion of data collection. The ability to meet this goal is dependent upon a system that will enable the effective and efficient capture, management, and analysis of the large volumes of interdisciplinary data.

The ability of the CPO's information management system to manage and disseminate the vast amounts of information, and its ability to accommodate changes in data types and methodologies, will have a major influence on the success of the program. As a result, development of an adequate information management system is as important to the success of the program as is collection of the data (NRC 1990).

1.4 IMS Objectives and Requirements

The information management system is intended to provide a set of tools to help record, manage, analyze, and dessiminate scientific data and other operational information collected during the program. The IMS consists of a computer infrastructure, with appropriate design, storage, accessing, processing, and communication tools, and a relational database which ultimately will contain three levels of data. The three data levels are the raw data level (D1), the QA/QC and results level (D2), and the data aggregates and interpretation level (D3) as described in Section 4.1.

Specific objectives of the IMS are as follows:

1. To capture data from field measurements and laboratory analyses;

2. To maintain records of types, numbers, and locations of

3. To provide a basis for tracking sample custody;

4. To provide a means of displaying and interrogating the data for QA/QC verification and validation;

5. To faciltate data reduction and analysis;

6. To accommodate database archival requirements; and

7. To support the rapid dissemination of information to various user levels.

8. To record and organize documentation.

To meet these objectives the following functionality is required in the IMS:

- Recording of field observations
- Tracking of samples
- Tracking of data files
- Tracking of sample shipments
- Data entry
- Conversion of recorded data to appropriate electronic format,
- Verification and validation of the data
- Recording of errors found during the verification of the data
- Communication of results from the Cooperators to the CPO
- Communication of results from the analytical laboratories to the Cooperators and the CPO
- Organization and integration of all results (field and lab data) into a form that will facilitate analysis of the data
- Accessing of information to facilitate the development and publishing of annual statistical summaries and other pertinent assessments.
- Transfer of aggregated data to the EMAP D3-level central IMS
- Dissemination of information to all other potential user levels

2.0 Schedule

To meet the above objectives and requirements, under the present time constraints, the system will need to be implemented in a phased approach. Three phases are envisioned:

Phase 1 -- Development of a field system for capturing results of sampling efforts beginning in the summer 1994. This phase includes the development of field data forms and a computerized system for capturing, interrogating, and making necessary modifications to the field data. The field system is based on an earlier version developed by the EMAP Louisianian Province and modified by the Carolinian Province to meet its specific needs. Some features of the system developed for the EMAP Virginian Province were also incorporated. The development of field data sheets and the corresponding computerized field system was completed in June 1994 in preparation for the summer 1994 sampling season. Phase 1 also includes outfitting the CPO with a DOS/Windows and SAS-based system running on personal computers (see Section 4.3 for further details) and initiating steps to link the initial PC-based system to an IBM RISC 6000 computer with a UNIX operating system (maintained by the South Carolina Marine Resources Research Institute, where the CPO is co-located) to allow additional high-end computing and to enhance communication capabilities via direct access to Internet.

Phase 2 -- Development of an analytical data base to capture results of sample analyses and to provide a basis for the reduction, statistical analysis, and interpretation of the data in support of EMAP Annual Statistical Summaries and other pertinent assessments. The basic framework for the data base is described in the present document (Appendix C). Refinements to the data-base structure, including development of specific submission formats for the various types of data files, will be initiated during the late summer to early fall of 1994 and will continue as the databases are being generated.

Improvements to the field system based on experiences of the summer 1994 sampling effort will be included in this phase. This effort will include conversion of data stored in the field system developed in Phase 1 to a file structure appropriate for incorporation into the overall relational database implemented with SAS.

Phase 3 - Integration of the Carolinian Province IMS with other national information systems including the EMAP-Estuaries centralized Information Management Center in Narragansett, RI and related NS&T databases. This phase includes the development of data aggregates as required by the EMAP-Estuaries program and submission of them to the EMAP Information Center. This integration will begin as results for the first statistical summary become available in late spring 1995, and will proceed thereafter as new information is developed.

3.0 Organizational Structure and Responsibilities.

Four different organizational levels share major responsibilities in the management and processing of Carolinian Province data. These organizations are:

- The Carolinian Province Office
- The State Cooperators
- Outside contract analytical laboratories
- The EMAP Estuaries Information Management Team

The roles and responsibilities of each organizational level are presented below.

3.1 Carolinian Province Office (CPO)

The Carolinian Province information management team will be responsible for management of the overall province-wide database and for final QA/QC to ensure that consistent sampling and analytical methods are being used across the various subregions and that overall data-quality objectives are being met for the program. In addition, the CPO will be responsible for the analysis, interpretation, and reporting of data at the province-wide level. The CPO will interact with the overall EMAP-Estuaries Director and the EMAP-Estuaries Information Management Center in Narragansett, RI to ensure that the data are compatible with the national EMAP-Estuaries database. The Carolinian Province information management team, in addition to the Province Manager, will consist of two to three staff members performing the following functions:

- IMS design, development, and coordination
- Data entry and formatting in support of D2-level database development
- Data QA/QC checks
- Data archival, tracking, and security
- Maintenance/management of IMS components (computer infrastructure and the database)
- Data documentation
- Data reduction and processing in support of province-wide statistical summaries and other pertinent assessments
- Data dissemination

The CPO Manager also will participate in fulfilling these various functions.

The Carolinian Province information management team will develop a cohesive information system intended to facilitate the planning, gathering, processing, analysis, and dissemination of the resulting data. This system will include:

- Standard data forms for field data collection
- Standard data shipment forms
- A computerized field system for the entry and interrogation of field data and related field operational information
- A sample and data-tracking system to track the custody of all samples and data products.
- Standard codes for taxonomy, analytical chemistry, sample types
- Standard data submission formats
- A comprehensive relational database for the storage and processing of all CP data and information

- Tools for the processing of data in a manner consistent with the overall EMAP sampling design and data analysis plan (Holland1990).

The Carolinian Province information management team will deliver the computerized field system to the State Cooperators in time for use during the first summer 1994 sampling season. Any subsequent modifications to the system will be forwarded to the Cooperators as soon as they are made. The Cooperators were trained in the use of the system during a field training session held in June 1994 at the CPO.

The Carolinian Province information management team will maintain the province-wide data base of verified and validated raw data in the relational information system. These data will be made available to various levels of the user community via modem or distributable electronic/optical media.

3.2 State Cooperators

The initial collection, tracking, and analysis of samples will be done by State Cooperators from the University of North Carolina-Wilmington, the Marine Resources Research Institute of the South Carolina Department of Natural Resources, and the Marine Research Institute of the Florida Department of Environmental Protection.

The Cooperators will be responsible for:
- Data collection in the field
- Sample collection and identification
- Recording observations and information on sample collections on data forms
- Transferring results from the data forms to the electronic system
- Transferring data from Hydrolab DataSondes to the computer
- Tracking of data forms, samples, shipments and diskettes
- Initial verification and validation of the field data
- Documentation of any QA/QC flags or related changes to the data base
- Transfer of the verified and validated field data, with copies of the original data forms, to the CPO within ten days of sampling
- Submission to the CPO of all verified and validated data resulting from the processing of samples in the laboratory (format requirements will be provided)
- Submission to the CPO of annual reports on results of work in respective subregions

The Cooperators will be required to follow standardized sampling and analytical guidelines for the program, meet specified data-quality objectives, and submit data in the required formats. However, staffing and specific approaches to data management within the Cooperators' organizations will not be dictated by the CPO. The CPO will supply available software and advice to assist with Cooperator-level data management functions if requested.

3.3 Analytical Laboratories

For this program analytical laboratories are defined as facilities performing:
- Chemical analyses (i.e., metals and organics from composited surficial sediment)
- Benthic community analysis
- Demersal fish/crustacean pathology and histopathology
- Toxicity testing (*Ampelisca abdita* solid-phase test, Microtox test, additional alternative bioassays with different species and biological endpoints)

- Sediment characteristics (grain size, moisture content analysis)

Some of these laboratories exist within the infrastructure of the State Cooperators' institutions. Others will be set up as contract laboratories reporting directly to the CPO or through subcontract arrangements under the Cooperative Agreements. These laboratories may choose their own methods of data storage and processing. However, verified and validated results must be submitted to the CPO in pre-specified formats. All lab data will be submitted as fixed-format ASCII-delimited files. The kind of information that these files should contain is described for each type of analyses in Appendix C. Further details of the specific submission formats will be developed by the CPO and supplied to the laboratories prior to completion of sample analyses (see Section 5.1 below).

3.4 EMAP Estuaries Information Management staff

An information management center has been established for the EMAP Estuaries program at the EPA Environmental Research Laboratory in Narragansett, Rhode Island. The information center is responsible for:

- Storage and dissemination of aggregated data for the entire EMAP-Estuaries program
- Design and implementation of information systems to meet the needs of the overall EMAP-Estuaries program and of the individual provinces
- Interfacing the EMAP-Estuaries data management effort with those of other EMAP resource components
- Establishing standards and procedures for all EMAP-Estuary provinces
- Facilitating the transfer of technology among the provinces, with other EMAP resource groups, and with other agencies
- Establishing liaisons with appropriate data management personnel in other agencies to arrange for cooperative data management efforts.

4.0 IMS Infrastructure

4.1 Levels of Data

The joint EMAP/NS&T program will have a diverse group of users often with unique individual requirements. Figure 1 is a conceptual model of various data levels and corresponding users. Each level of data contains different but interrelated information. In many cases the differences are in the level of detail and the amount of value added to the data. All levels are logically connected to one another by relationships between the samples, stations, sampling dates, systems and regions.

D1 (Raw Data Level) -- D1 data for the CPO consist of the unanalyzed field data and analytical results produced by the Cooperators and other participating analytical laboratories. This level of data is captured in the data sheets, the computerized field system, and in the raw data files delivered by the analytical laboratories. Initial QA/QC checks -- i.e., verification of data completeness and recording accuracy, and validation of data reasonableness including confirmation that there are no deviations outside the acceptable tolerance ranges for the various parameters -- are performed at the D1 level by the State Cooperators. A second level of QA/QC checks is performed by the CPO QA/QC staff to ensure compliance with overall data-quality objectives of the joint EMAP-Estuaries/NS&T program. The principal users of these data are the regional field and laboratory scientists operating under the State Cooperative Agreements in efforts to generate the initial data bases.

D2 (Data Assessment level) -- After data have been completely verified and validated they are reorganized into a format that will optimize analysis and interpretation. These reformatted data comprise the D2-level database. The reformatting includes substituting some of the QA/QC data with flags indicating that the QA/QC has been performed and that the data have achieved a definable level of confidence. Attributes of the various D2-level data entities are described in Appendix C. The principal users of these data are the senior scientists within the Carolinian Province, including the CPO province manager and information management staff and the principal investigators and data analysts within the State research institutions. These data also will become the foundation for multiple-year data analyses.

D3 (Data Aggregation level) -- Derived parameters from data aggregates are also developed and recorded by station and date in support of various national-level comparisons. Examples of such parameters are community measures and indices resulting from the analysis of benthic infauna and fish population data. The principal users of these data are regional administrators, the general science community, and analysts performing inter-province and inter-resource group comparisons.

D4 (Management Strategy Level) -- This level consists of results of the Annual Statistical Summaries and multi-year assessments for use in reaching an understanding of the extent of coastal resources, the status of their health, how resource conditions are changing with time, and the effectiveness of pollution prevention measures. The principal users of these data are government administrators, policy-makers, science advisory boards, the general science community, and public interest groups. The structure of this data level is determined by the EMAP Information Management Technical Coordinator.

4.2 The Cooperators' IMS Components

The Cooperators will be collecting, storing, verifying and validating, and analyzing data obtained from stations within their respective subregions. As independent organizations within the Carolinian Province effort they will require their own hardware and software to fulfill information management goals with respect to this information.

4.2.1 Hardware

Each Cooperator will require a DOS-based, 486 PC (or larger unit) for in-house data management and computing needs and a DOS-based laptap/notebook computer for capturing, interrogating, and tracking field data. Each system will be equipped with a modem that can function at 2400 baud or higher (9600 baud is recommended). In order to run the field-system software supplied by the CPO, the Cooperators' computer systems must have DOS version 6.2 with a minimum of 640K of memory of which at least 500K must be free.

Bar codes will be used to facilitate data input, and tracking of samples, shipments, data sheets and diskettes. The CPO will supply each Cooperator with bar-coded labels and bar-code readers in time for the initial sampling season.

4.2.2 Software

The Cooperators will be supplied with a field data-entry system designed to accommodate the following operations:

- Data entry
- Initial verification and validation of the field data
- Programming and downloading of data from Hydrolab DataSondes
- Communication between field teams and their home offices
- Communications between the cooperators and the CPO
- Sample tracking
- Output of the data readable in DBaseIV, SAS, or as ASCII text.

The CPO is not specifying any other software; however, it is recommended that the Cooperators each have word processing, spreadsheet and relational data base software available to meet their information management needs.

4.3 The CPO's IMS Components

The CPO's Information Management System will serve as the regional information center responsible for the storage, maintenance, and distribution of raw data for the overall Carolinian Province.

The system described below is intended to meet the requirements for at least the first year of sampling. The plan includes a migration path from the simple system described below to a Local Area Network (LAN) employing both UNIX and Windows.

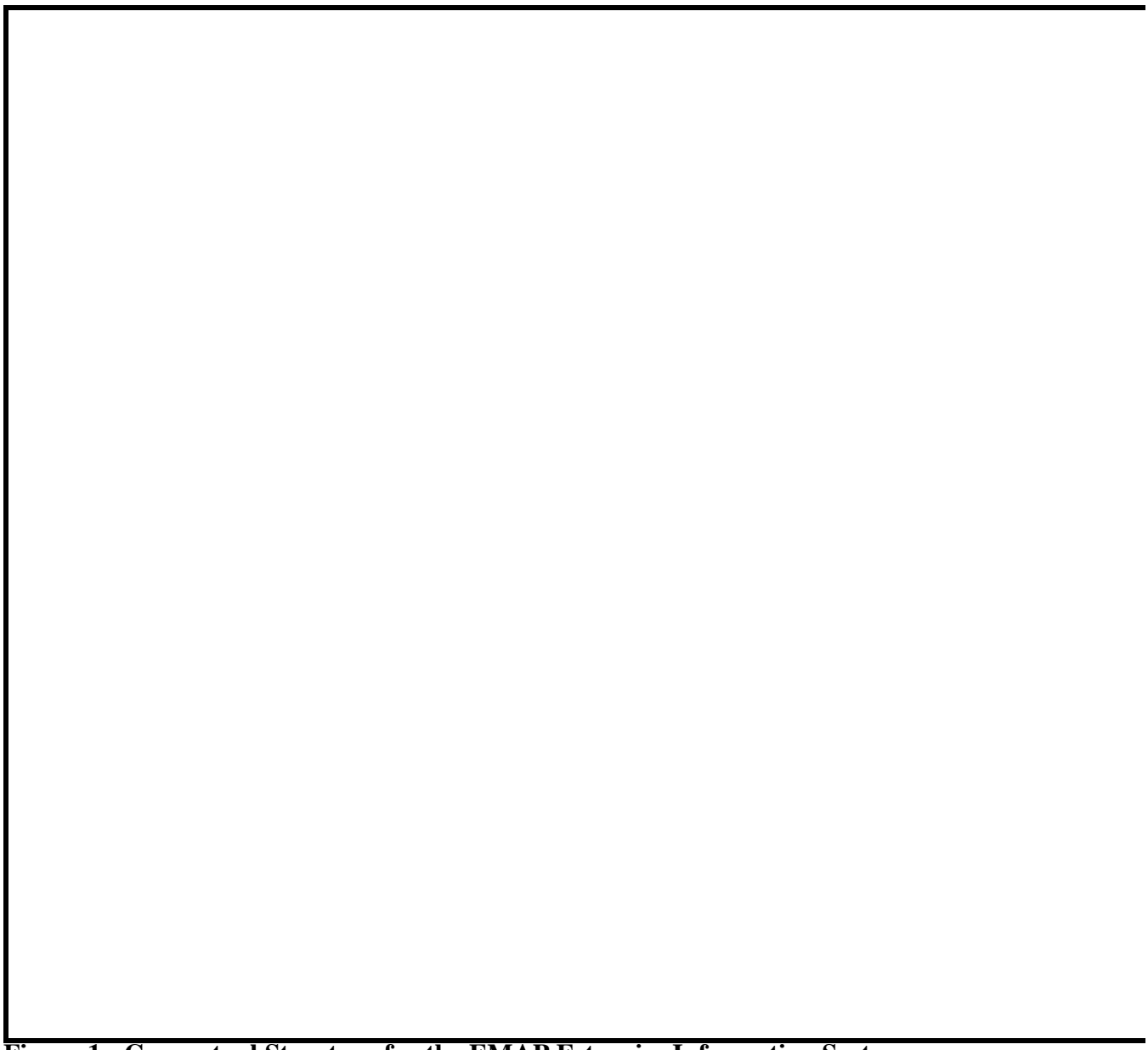

Figure 1 - Conceptual Structure for the EMAP Estuaries Information System

4.3.1 Hardware

The CPO will be outfitted with a Dell personal computer containing an Intel Pentium/90MHz microprocessor, 16 Megabytes of RAM, 1 Gigabyte hard drive, 1.44 Megabyte floppy disk drive, multisession 250ms CD-ROM, and a color monitor. An external Colorado Systems 250 MB Trakker tape drive will be included for backing up disks. This PC will act as the primary CPO computer (hereafter called the CPO Server). All official files and data bases for the 1994 summer sampling season will be maintained on the CPO server. This machine also will be used as a work station for CPO data management staff. The tape drive is specified by model so that it can be used on a number of machines.

The information management plan includes development of a flexible communications and backup computer infrastructure. This feature will be accomplished by outfitting the CPO with an additional Gateway notebook containing an Intel 486/33 MHz microprocessor, 12 MB RAM, a 1.44 MB floppy drive, internal 9600 baud modem, color monitor, and a 200 MB hard drive. This machine will be a backup unit for field work and electronic instrument communications, and also will serve as a communications server for the routine upload of data from the Cooperators. When the notebook unit is required as a backup in the field, the CPO server will double-up as a communication server.

The communications server will be loaded with the field system receive module, which will enable the cooperators to upload files from the field collection. The communications server also will be loaded with Procomm Plus software to enable dial-in access to the D2 data bases. The communication server will be connected to a dedicated telephone line which will allow outgoing and incoming calls without transfer through a switchboard or a PBX.

The CPO will be equipped with additional hardware peripherals to enable comprehensive data processing and assessment.

In the fall of 1994, the PC-based system will be linked directly to an IBM RISC 6000 computer with a UNIX operating system (maintained by the South Carolina Marine Resources Research Institute, where the CPO is co-located) to allow additional high-end computing and to enhance our communication capabilities via direct access to Internet. Long-term plans also include the addition of a number of work stations to enhance capabilities for accessing the data base and performing data analyses.

No inhouse Geographic Information System (GIS) capabilities are planned at this time for the CPO facility in Charleston, though the CPO will seek support for such services through the EPA EMAP Information Center in Narragansett, RI; NOAA/NOS offices in Silver Spring, MD; or the new NOAA Ecosystem Health Center in Charleston, SC.

4.3.2 Software

The core software for recording and processing field data is the customized field system referenced throughout earlier sections of this document and which was modified from an original version developed by the EMAP Louisianian Province. This system is written in C and is in the public domain. The system will be used to record field information, track samples and sample shipments, and to perform initial and follow-up data verification/validation by the State Cooperators and CPO staff, respectively. In addition, the

data-receive portion of the system will be used to facilitate communications and data transfer between the Cooperators and the CPO.

For the initial year of data collection and analysis, the relational data management system required to meet the needs of the CPO will be implemented in SAS. Additional data management and data processing will be done in DBase and in Microsoft Access. SAS also will be used as the core data analysis tool. Plans include migration from SAS to ORACLE as an ultimate data management tool, as has been done in other EMAP provinces. However, because Oracle lacks the statistical capabilities of SAS, SAS will remain as the core data-analysis tool once data management functions are transferred to ORACLE.

Development of all data forms (hard copies) will be done in PerForms Plus Professional. All electronic communications except for the communications of field data will be done using Procomm Plus. Additional standard software for use in conjunction with the CPO's DOS/Windows-based PC system will include: DOS 6.2, Windows 3.1, Microsoft Word 6.0, Microsoft Excel 5.0, Powerpoint 4.0, Norton Utilities, Microsoft Access, and R+R report writer.

5.0 Data Flow and Processing

5.1 Data flow

The flow of data from the Carolinian Province will follow the pathway shown in Figure 2. Field data are recorded initially by hand onto data sheets. The transfer of data from the data sheets to the field computer system will occur as quickly as possible after sample collection (usually within 24 hours) so that initial QA/QC checks can be performed to ensure that all sampling requirements at a station have been met and that any field-recorded measurements look reasonable. As problems arise, the Field Coordinators are expected to contact the CPO Manager, in addition to the corresponding Cooperator PIs, as quickly as possible (but within 24 hrs) to discuss potential solutions. Verbal progress updates from the Field Coordinators or Lead PIs to the CPO Manager (or representative) are also required periodically (every few days) when operations are running smoothly.

Initially verified and validated data are backed-up on diskettes and transferred to the CPO within 10 days of sample collection. At the CPO, a second level of QA/QC is performed to ensure compliance with overall data quality objectives of the joint EMAP/NS&T program. Once the data have been fully verified and validated, they are reorganized at the CPO into a format that can accommodate data analysis, interpretation, and dissemination.

Data resulting from the processing of samples (lab data) will be generated by State Cooperator laboratories and outside contract laboratories. As with the field data, these data will be verified and validated initially by laboratory in-house QA/QC staff. Verification checks will be performed to ensure data completeness and recording accuracy; validation checks will be performed to ensure compliance with targeted levels of accuracy, precision, detection limits, and other data quality objectives.

These initially verified and validated lab data are then backed-up on diskette and transferred to the CPO. The lab data should be submitted as fixed-format ASCII-delimited files. The kind of information that these files should contain is described for each type of analyses in Appendix C. Further details of the specific submission formats will be developed by the CPO and supplied to the laboratories prior to completion of sample analyses.

As with field data, a second level of QA/QC is performed on the lab data by the CPO staff to ensure data completeness and compliance with overall data quality objectives of EMAP/NS&T. Once the data have been completely verified and validated, they are re-organized at the CPO into a format conducive to data analysis and assessment. Aggregated D3-level data will be transferred electronically by modem (along with additional back-up diskettes or tapes) from the CPO to the EPA EMAP-Estuaries Information Center in Narragansett, RI for ultimate storage as part of the national-level database.

Figure 2 - Data Flow Schematic for the Carolinian Province

5.2 Field Information System

The computerized field system will be used as a land-based system. All computer processing and interfacing with instruments will be done on shore. The field system will keep track of the sampling data entered by station, date, and data form. All field data, observations, and sample-tracking data, except for records from the deployed Datasonde units, will be entered initially onto data forms by hand. Data from the deployed Datasondes will be downloaded electronically directly from the Datasondes to the field computer system (usually within 24 hours of data collection).

Data sheets are presented in Appendix A. Table 1 lists the corresponding computer versions of these sheets, the computer Form ID number, and a brief explanation of the purpose of the sheet.

Shipment data will be tracked by shipment number. The Datasonde calibration information will be stored and tracked by serial number and by calibration date. The system keeps track of all files which have been created or modified since the last communications with the receiving system. These files are transferred the next time a connection is made. At the time that data-entry is being performed, a diskette is inserted into the computer system and the diskette is backed up using the Backup option on the field system menu. The diskette will be labeled clearly to identify its contents.

Field crews will download the Datasondes and transfer data from the field sheets to the computerized field system as soon as possible following completion of the data collection (ideally and usually within 24 hours). As discussed in the previous section, this data-entry step is done as quickly as possible so that initial QA/QC checks can be performed to ensure that all sampling requirements at a station have been met and that any field-recorded measurements look reasonable. This process provides an opportunity to remedy any specific sampling problems within a few days of the original site visit, thus avoiding a prolonged hiatus between sampling events at a station. Any required changes in the data file will be made using the QC Editor. The editor records the change made, the person who made the change, and the reason for the change. These QA data become part of the permanent D1 record. QC editing can be performed by the Cooperators in the field or once the data have been transferred to the laboratory. The initially verified and validated field data for any given station are submitted to the CPO within 10 days of the sampling (see next section).

As mentioned above, Datasonde files will be downloaded directly from the Datasondes to the field computers. These continuous records will be stored on both the hard drive and on the diskettes returned to the Cooperators' operation centers.

5.3 Processing of Field Data

Once field data are acquired, the Cooperators will use the QC editor in the field system to perform initial data verification and validation. The Cooperators may decide to truncate the Datasonde files. If this is done the original file must be retained in its complete form. The original and truncated files are to be submitted to the CPO along with a documentation file indicating what changes were made and the justification for the changes. Verified and validated field data will be submitted by the Cooperators to the CPO within 10 days of sample collection. Copies of the original data sheets are to be submitted along with the data

Table 1. Summary of the field data forms for CP94.

Form Name	Form ID	Description of the form
STATION1	ST194A	Detailed information about first day visit to a station
STATION2	ST294A	Detailed information about second day visit to a station
DSONCAL	DSL94A	DataSonde service and download record
DSONUSE	DSF94A	DataSonde field sheet
HYDROFIL	HPD94A	Hydrographic profile data sheet
SEDCOMP	SGC94A	Record of sediment composite samples collected
SEDQAQC	SQC94A	Record of QA/QC samples
INFAUNA	SGD94A	Record of sediment grab samples for community analyses
TRAWL	FT194A	Fish trawl data sheet
FISHPATH	FDS94A	Trawl pathology and reference collections
SHIPMENT	SHP94A	Sample tracking form

files. The Cooperators will maintain the original data sheets for at least seven years following the completion of each season's sampling.

The D1-level information contained in these files is organized in accordance with the customized formats provided by the field system software. The data base structure for D1-level data is described in Appendix B. The Cooperators can use the field system to output the field data to either DBase or ASCII files for loading into their own systems in support of subsequent in-house computing needs. Descriptions of the file formats that the CPO will develop and use to re-organize the field data into a structure more suitable for subsequent data-analysis functions at the CPO can be supplied to the Cooperators if requested.

5.4 Processing of Laboratory Data

Analytical laboratories (either State Cooperator-based or outside contract labs) will forward data to the CPO as fixed-format ASCII-delimited files. The kind of information that these files should contain is described for each type of analyses in Appendix C. Further details of the specific submission formats will be developed by the CPO and supplied to the laboratories prior to completion of sample analyses. Data may be forwarded via modem or diskette. All modem transfers to the CPO will be followed, however, by a backup diskette.

For many of the parameters that are being measured, samples will be processed in laboratories maintained by the Cooperators. In such cases, the Cooperators will have direct access to the original data files. The official version of the fully verified and validated data base, however, will be the one maintained at the CPO. This version also will be the most complete one given the fact that it will contain field data and results of sample analyses from all participating components of the program. Thus, all data analyses and interpretations performed by the Cooperators in support of Carolinian Province program requirements must be done using the official database.

The CPO will receive incoming data from the Cooperators and other participating contract laboratories. The CPO will be able to handle incoming data via modem or diskette. All incoming data will be maintained on the original diskettes on which they are delivered. The data from the diskettes will be loaded into the CPO D1-level data base for further verification and validation by CPO QA/QC staff. Once verification and validation are completed, the data will be converted into the D2 database described, generically, in Appendix C. The verified and validated results will be distributed to the Cooperators upon request.

5.5 Labeling System for Samples

An electronic, bar-code based labeling system has been set up to facilitate the tracking of samples, data sheets, field observations, and diskettes. This labeling scheme is mandatory. All results and observations must be reported with the official Carolinian Province identification code.

The basic label is based on a core 12 character code which includes information about the sampling program (i.e., province and year), the station, and the sample itself. The format for this "core" label is CP94xxxyyyzz, where:

CP = Carolinian Province.

94 = 1994 summer sampling season.

xxx = station number (from Observation column of the 1994 CP station list frame, April 21 version).

yyy = sample type (see Table 2).

zz = replicate number. If there are no replicate numbers then zz=00.

For demersal fish/crustacean samples (collected in trawls), four additional blank spaces are left at the end of the label for writing in the fish species number (first and second blanks) and specimen number (third and fourth blanks). These last four identifiers correspond to the same numbers entered onto the data sheets for biota captured in the trawl samples. An example of this type of label, prior to filling it in, is: CP94xxxyyyzz_ _ _ _.

There are two additional special label types. A ten character label will be printed and made available for use in conjunction with the "station information", "Deployed DataSondes" and "DataSonde Profiler" data forms. These ten character labels follow the same format as core labels, except that the last two characters designating the replicate number are deleted. Also, a shipment label is available for tracking sample shipments. The format of this label is:

CP94sss, where sss = shipment number from 001 to 400.

In addition to these labels, generic labels will be printed and made available to use as replacement labels or for coding of unanticipated samples. The first four characters, designating the province and sampling year, will be printed and the last eight characters will be left blank to accommodate any unforseen need.

Below are examples of various label types:

CP94001STN	=	Station label for Station 1 during the 1994 summer sampling season in the Carolinian Province.
CP94002INF02	=	Infaunal Replicate #2 from Station 2.
CP94010MET00	=	Subsample of composited surficial sediment for metals analysis from Station 10.
CP94084TWL011005	=	Specimen pathology label for Specimen #5 of Species #10, from Trawl #1, at Station 84. [Last four characters are hand entered].

Table 2. List of three-digit codes designating the sample type

Type Code	**Definition**
INF	Benthic Infauna Sample
ORG	Hydrocarbon
MET	Metals
AMP	Amphipod Toxicity Test
MTX	Microtox
TWL	Fish Trawl
DS3	Hydrolab
TOC	Total Organic Carbon
SED	Sediment Characteristics
PRO	Water Quality Profile
WCL	Secchi Depth
STN	Station Label

6.0 The Data Base Design

The CPO data base will consist of (1) original, unprocessed D1-level field and laboratory data and (2) D2-level field and laboratory data that have undergone full QA/QC verification and validation and have been re-formatted for data analysis and dissemination purposes. The design of the D1-level data base is tied very closely to the structure of the field information system and its associated quality-assurance editor. The D2 design is intended to be a fully normalized data base suitable for data analysis and interpretation in support of the development of annual statistical summaries and the creation of the D3 database maintained at the EMAP Estuaries Information Center in Narragansett RI.

6.1 Raw Data Level (D1)

D1 data for the CPO consist of the unanalyzed field data and analytical results produced by the Cooperators and other participating analytical laboratories. This level of data is captured in the data sheets, the computerized field system, and in the raw data files delivered by the analytical laboratories. Most records in the D1 database are identifiable by the combination of date, station code, sample type, and replicate number. In the case of individual biological specimens, the unique coding needs to include a species designation and a fish number that are cross-referenced on the fish-trawl data forms. The cross-referencing of these samples is necessary to allow the linking of the various types of measurements made on the same organism. The D1 information system captures all of this information in the data label and on the data forms.

Table 3 lists the various data files comprising the field portion of the D1 data base. These files are generated by the computerized field system and represent a comprehensive record of the EMAP Carolinian Province results for each sampling event. A detailed "data dictionary" for the field portion of D1 data base is presented in Appendix B.

Formats for capturing and reporting results of laboratory analyses at the D1 level will be developed by the CPO during the late summer and fall of 1994 and provided to the Cooperators and other participating contract laboratories. The various types of files for recording results of sample analyses will need to contain the same kind of information that subsequently will become the D2 database (see Appendix C). In addition, the D1 files will contain QA/QC results and other related laboratory information documenting the history of the sample.

6.2 Data Assessment level (D2)

The D2-level data base consists of field data and results of sample analyses that have gone through the full QA/QC process and have been re-organized into a format suitable for data analysis and interpretation. The initial data are organized into a format intended to optimize the collection and handling of the raw data, including information about the history of the sample which may not go into a statistical analysis. At the D2 level, the data are re-organized into a format that will allow tabulation of all results by date, station, station classification, and sample type. QA/QC results and related information about the history of the sample, which will not be used in data analysis stages, also are removed as the data evolve from the D1 to the D2 level. The data arrayed in this fashion will allow easy generation of cumulative distribution functions (CDFs), summary statistics and exploratory analyses for creation of benthic, fish, and ecological indices.

In addition to the reformatting and arranging of the raw data, some data will require aggregation, interpretation and synthesis of results for the raw data to be meaningful in the EMAP context. Examples of the required aggregations include the development of benthic community parameters, such as number of species, total number of individuals, number of opportunists, numbers of pollution-tolerant and pollution-sensitive species, as well as others (see data dictionary in Appendix C, entity BENSUM). Another example is the level of synthesis required to portray information from the Datasonde time-series and depth-profile records in the most useful and interpretable form.

Appendix C lists a first draft of the data dictionary for the D2 (assessment level) databases. The various fields will require enhancement once the assessment work begins. Table 4 lists the entities for the D2 database as they are currently understood. This D2 design is based on the Virginian Province D2 design and has been enhanced to meet the specific needs of the Carolinian Province.

Table 3. Data Directory for the Field Portion of the Carolinian Province D1 Data Base.

DATASET	Description
BENINF	Information about the benthic infauna grab samples
BOATLOC	Details about the sampling event at a particular station on a particular date
DICT	The Carolinian province data dictionary for D1
DIRECT	The Carolinian Province database directory
DOMSHELL	An empty shell which cn be used to load the results of a Hydrolab deployment
DSONCAL	Data pertaining to the servicing and calibration of HydroLab DataSondes
DSONDUSE	Information about the deployment and Quality control checks of DataSondes
FISHPATH	Information about fish specimens returned to the laboratory
FTRAWL	Information about the overall trawls
FISHCNT	Information about the fish caught in a trawl
HYPROFIL	Data regarding the hydrographic profiles developed using a vertical profiler
HYPRODET	Detatiled Vertical Hydrographic measurements made at different depths
MAS_CON	Master list of contacts
PHONBOOK	List of people involved in the program
QA_CODES	List of acceptable QA/QC codes
SAMPLOG	List of samples taken in the field with sample identifications
SEDCOMP	Information about the sediment composites taken for chemistry and sediment characterization
SEDQA	Data regarding the QA/QC samples collected in the field
SAMPTRAK	Data about a container of samples.
SAMPDET	Details about the samples in each shipment
SHIPMENT	Details about the shipments of each sample container
SPECLIST	A list of the species which have been found in the province.
STATIONS	Summary of the planned location for each station

Table 4 - Data Directory the Carolinian Province D2 Data Base.

Entity	Description
ABUNDANC	Number of Each Species in a Sample
ANALSET	Tracking Info on Chemistry Sample Group
ANALYTES	Chemistry Analyte Descriptive Info.
BENGRN	Benthic Grain Size Sample Field Data
BENINF	Benthic Infauna Sample Field Data
BENSUMRY	Event Aggregated Species/Biomass Data
BEN_TAX	Taxonomic Classification for Benthic Sp.
BOATLOC	Boat Location/Sampling Event Data
CATALOG	Summary Statistics for Each Dataset
CATEGORY	EMAP Contacts Subdivided into Categories
CHEMLOG	Sediment Chemistry Sample Log File
CHEMRES	Inorganic Compound Conc. in Sediment
CONTACTS	EMAP Personnel/PIs by Dataset/Year
DICT	On-Line Data Dictionary
DIRECT	On-Line Data Directory
DOMSHELL	Hydrolab-SAS Shell for ASCII File
DO_SUM	Hydrolab Retrieval-Summary Data
EVENTLOG	Sampling Event/Sample Collection Data
FISHCNT	Fish Species Counts by Trawl
FISHCHEM	Fish Chemistry Tracking Info.
FISHPATH	Gross Fish Pathology Exam-Field Data
FISH_TAX	Fish Taxonomy Information
FTRAWL	Fish Trawl Field Data
FULL_SED	Silt-Clay/Grain Size Distribution/Sample
HYDDEP	Hydrolab Deployment Field Data
HYDRET	Hydrolab Retrieval Field Data
MAS_CON	EMAP Program/Province Personnel List
MICROTOX	Results of MicroTox Analyses
PHONBOOK	Information to Contact EMAP Affiliates
QA_CODES	Definition - All Quality Assurance Codes
SAMPLOG	Sample Collection and Shipment Data
SEDGRABS	Sediment Chem/Tox Grab Field Data
SEDTOXSM	Sediment Tox Test-Sample Summary Data
SILTCLAY	Moisture/Silt-Clay for Each Benthic Core
STATIONS	Characterictics of Sampling Stations

7.0 Quality Assurance and Control

Quality assurance and control for the information system and data processing functions will follow guidelines established in the Carolinian Demonstration Project 1994 Quality Assurance Project Plan (QAPP) (Kokkinakis et al. , 1994b). The Information Management Plan can be modified to accommodate any necessary changes to the QAPP as the program evolves over the next several years. QA/QC procedures for information management and processing also are consistent with those used in both the Louisianian and the Virginian Provinces over the past five years. These various procedures, which will be followed for the 1994 sampling period, are presented briefly below.

Verification is the process of checking the data to determine that all required samples and measurements were obtained and that all data entries were recorded correctly. Initial verification of field data will be achieved by the Cooperators doing a 100% check of the data in the field system against the data sheets completed by the field crews. Any recording errors will be noted and corrected by the Cooperators. After the data have been transferred to the CPO, an additional 10% random check will be made by the CPO staff against the copies of the data sheets submitted along with the D1 data files.

Validation is the process by which verified data are evaluated from a technical perspective to determine if the results make sense and are consistent with data quality requirements (e.g., within stated levels of accuracy and precision). This process is accomplished by a variety of approaches. The Carolinian Province will use a combination of range checking, analysis of outliers, comparison with historical data, evaluation of quality control samples, and adherence to measurement quality objectives established in the QAPP. Validation will be done by both the Cooperators and by the CPO staff. Inconsistencies noted in the validation steps will be recorded and the data will be flagged but will not be removed from the data base. Obviously erroneous measurements (e.g., the improper recording of a Datasonde unit) that can be caught early-on during the initial field validation can be repeated by re-sampling.

All data communications will be quality-assured by using industry-standard communication protocols which do internal data checking to ensure that data files are properly transferred.

The integrity of the Carolinian Province data will be ensured by built-in and scheduled data back-ups, including: diskette back-up, long-term maintenance of field data sheets, copies of diskettes prior to shipment from the Cooperators to the CPO, and daily tape back-ups of all Carolinian Province directories by the CPO.

Once data are delivered to the Carolinian Province only a limited number of information management personnel will have write, delete, and modify access to the database. Most users will be given only read access to the data.

8.0 References

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Appendix B - D1 Data Dictionary

The table below describes the attributes (fields) for each entity (table) in the D1 data base.

VARTYPE = Indicates the type of variable; C = Character, N = Numeric,.
VARFMT = Format of the field; MMDDYY = Date numeric with a width of 6;
for character field the number indicates the width of the field;
for numeric fields if there is a number alone in the format column
then the field is an integer of the width given in the format column.
If the VARFMT is given as Fx.y then the number is a real number
with a width of x and y decimal places.
KEYFIELD = Indicates if the field is a key field (Y1) which means the field is part
of the unique identification for a record In the entity. If the
KEYFIELD contains a Y2 then the field is a foreign key which
means it will be regularly used to cross reference the record in this
entity with records in other entities.

DATASET	VARNAME	VARLABL	VARTYPE	VARFMT	KEYFIELD
BENINF	STATION	Station Identifier	C	10	Y1
BENINF	SAMPLEID	Benthic Infauna Sample ID Number	N	12	Y2
BENINF	EVNTDATE	Event Date	N	YYMMDD6	Y1
BENINF	BENSEQ	Grab Associated with Infauna Sample (#)	N	2	Y1
BENINF	BENTIME	Time grab was collected	N	5	

BENINF	BENCOLOR	Benthic Sediment Dominant Color	C	15	
BENINF	BENTYPE	Benthic Sediment Dominant typeType	C	15	
BENINF	BENSMELL	Benthic Sediment Smell	C	15	
BENINF	BENCOM1	Benthic Grab Comments 1	C	78	
BENINF	BENCOM2	Benthic Grab Comments 2	C	78	
BENINF	BENCOM3	Benthic Grab Comments 3	C	78	
BENINF	BENCOM4	Benthic Grab Comments 4	C	78	
BENINF	BENNONE	No visible biology on surface	C	1	
BENINF	BENTUBES	Worm Tubes found on surface Sediment	C	1	
BENINF	BENCRUST	Crustaceans found on surface Sediment	C	1	
BENINF	BENCLAM	Molluscs found on surface of sediment	C	1	
BENINF	BENVEG	Vegetation found in Benthic Sediment	C	1	
BENINF	BENALGAE	Molluscs found in Benthic Sediment	C	1	
BENINF	BENBIOTH	Other Infauna found in Benthic Sediment	C	1	
BENINF	BNLATDG	Degrees latitude where sample was taken	N	3	
BENINF	BNLATMN	Minutes latitude where sample was taken	N	5	
BENINF	BNLONDG	Degrees Longitude where sample was taken	N	3	
BENINF	BNLONMN	Minutes Longitude where sample was taken	N	5	
BENINF	JARS	Number of Jars needed for samples	N	1	
BENINF	WATRDEPT	Depth of water where sample was taken	N	4	
BENINF	BNFLDENT	Person who entered the data in field	C	25	
BENINF	BNCMPENT	Person who entered the data into computer	C	25	
BOATLOC	LAUNCH	launch site for for second visit	C	15	
BOATLOC	BOATNAME	Name of the boat used in sampling	C	15	
BOATLOC	DSONDRET	Indicates if Datasonde was recovered	C	1	
BOATLOC	DSONDDEP	Indicates if the Data Sonde was deployed	C	1	
BOATLOC	DSONDRET	indicates if a datasonde was retrieved	C	1	
BOATLOC	SAMP	Indicates if samples were taken on visit	C	1	
BOATLOC	LRNLATDG	Loran latitude degrees	N	3	
BOATLOC	LRNLATMN	Loran Latitude decimal minutes	N	5.2	
BOATLOC	LRNLONDG	Loran longitude degrees	N	3	
BOATLOC	LRNLONMN	Loran longitude decimal minutes	N	5.2	
BOATLOC	GPSLATDG	GPS latitude degrees	N	3	
BOATLOC	GPSLATMN	GPS Latitude decimal minutes	N	5.2	
BOATLOC	GPSLONDG	GPS longitude degrees	N	3	
BOATLOC	GPSLONMN	GPS longitude decimal minutes	N	5.2	
BOATLOC	TD1	Loran time delay 1	N	8.2	
BOATLOC	TD2	Loran time delay 2	N	8.2	
BOATLOC	LOC_AUTH	instrument authority for locating sampling	C	5	
BOATLOC	CRWCHIEF	Captain at time of sampling	C	25	Y2
BOATLOC	CRWMEMB1	Crew member 1 at time of sampling	C	25	Y2
BOATLOC	CRWMEMB2	Crew member 2 at time of sampling	C	25	Y2
BOATLOC	CRWMEMB3	Crew member 3 at time of sampling	C	25	Y2
BOATLOC	EVNTDATE	Event Date	N	YYMMDD	Y1
BOATLOC	BEGTIME	Time of Beginning of Sampling Event	C	5	
BOATLOC	TRASH	Trash Present at Station (Y/N)	C	1	
BOATLOC	OILSLICK	Oil Slick on Water at Station (Y/N)	C	1	
BOATLOC	WTH_SUN	Weather Conditions--Sunny (Y/N)	C	1	

BOATLOC	WTH_PSUN	Weather Conditions--Partly Sunny (Y/N)	C	1
BOATLOC	WTH_OCST	Weather Conditions--Overcast (Y/N)	C	1
BOATLOC	WTH_RAIN	Weather Conditions--Rainy (Y/N)	C	1
BOATLOC	WTH_WIND	Weather Conditions--Windy (Y/N)	C	1
BOATLOC	WTH_FOG	Weather Conditions--Windy (Y/N)	C	1
BOATLOC	SCNDCALM	Sea Condition Calm (Y/N)	C	1
BOATLOC	SCNDCHOP	Sea Condition Choppy (Y/N)	C	1
BOATLOC	SCND_RUF	Sea Condition rough (Y/N)	C	1
BOATLOC	TRASHCOM	Description of the trash	C	78
BOATLOC	STNCOM1	Station comment 1	C	78
BOATLOC	STNCOM2	Station comment 2	C	78
BOATLOC	STAMOVED	Was the Station Moved? (Y/N)	C	1
BOATLOC	ENDTIME	Time Sampling Event Ended	C	5
BOATLOC	VISITORS	Visitors on the boat on day of sampling	C	53
DICT	NODE	Node Which Data Set Sits On	C	10
DICT	PROJECT	Project Which Generated Data	C	15
DICT	DATASET	SAS File Name	C	20
DICT	VARNAME	Variable Name	C	8
DICT	VARLABL	Variable Label	C	40
DICT	VARSHARE	Variable exists on Multiple Files?	C	1
DICT	VARTYPE	Variable Data Type	C	4
DICT	VARFMT	Variable Format	C	10
DICT	VARNUM	Variable Number within dataset	N	3
DICT	KEYFIELD	Key field in dataset	C	3
DICT	VALUESET	File name of field code resol. (if any)	C	40
DICT	VARFILE	File Spec. of doc on detailed field info	C	60
DIRECT	NODE	Node Which Data Set Sits On	C	10
DIRECT	PROJECT	Project Which Generated Data	C	15
DIRECT	DATASET	SAS File Name	C	20
DIRECT	LIBRARY	Library Name in Which the Data Resides	C	40
DIRECT	LOG_LIB	Logical Directory Name for Library	C	10
DIRECT	DSTYPE	Type of Data: Data, View, Ascii File	C	10
DIRECT	ACCESS	Lowest Access Code with Read Access	C	10
DIRECT	FILEDESC	Description of Dataset	C	40
DOMSHELL	SEQNUM	Record Number for Hydrolab Measurements	N	
DOMSHELL	DATE	Date of Hydrolab Measurements	N	
DOMSHELL	TIME	Time of Hydrolab Measurements	N	
DOMSHELL	TEMP	Temperature (Deg C)	N	
DOMSHELL	PH	pH (pH units)	N	
DOMSHELL	SPCOND	Conductivity (mS/cm)	N	
DOMSHELL	SALIN	Salinity (ppt)	N	
DOMSHELL	PCTDO	Dissolved Oxygen (% saturation)	N	
DOMSHELL	DO	Dissolved Oxygen (mg/l)	N	
DOMSHELL	DEPTH	Depth of Measurements (m)	N	
DOMSHELL	BATT	Battery Reading (volts)	N	

DSONCAL	DSSERNUM	Data sonde serial number	c	12	Y1
DSONCAL	BATSTART	Battery voltage at start	N	4.1	
DSONCAL	BATEND	Battery voltage after change	N	4.1	
DSONCAL	BATCHANGE	Were batteries changed (Y/N)	C	1	
DSONCAL	MEMCHECK	Was membrane checked (Y/N)	C	1	
DSONCAL	PHCHECK	Was pH checked (Y/N)	C	1	
DSONCAL	SALCHECK	Was Salinity Checked (Y/N)	C	1	
DSONCAL	DEPCHECK	Was Depth Checked (Y/N)	C	1	
DSONCAL	MEMCHANG	Was Membrane changed (Y/N)	C	1	
DSONCAL	PHCHANG	Was pH probe serviced (Y/N)	C	1	
DSONCAL	SALCHANG	Was Conductivity Probe serviced (Y/N)	C	1	
DSONCAL	DEPCHANG	Was depth probe serviced (Y/N)	C	1	
DSONCAL	SERVE_BY	Person who did service	C	20	
DSONCAL	CALDATE	The date the calibration was done	MMDDYY	6	Y1
DSONCAL	CALTIME	The time the calibration was done	C	5	
DSONCAL	TEMPSTAN	The temperature of the standard - Degrees C	N	4.1	
DSONCAL	SALSTAN	The salinity of the standard	N	4.1	
DSONCAL	SPCDSTN	Specific Conductance of the standard	N	4.1	
DSONCAL	PH7STN	The standard pH (targeted at 7)	N	4.1	
DSONCAL	PH10STN	The standard ph (targeted at 10)	N	4.1	
DSONCAL	DEPSTN	The standard depth (should always be 0)	N	4.1	
DSONCAL	TEMPMEAS	The measured temperature	N	4.1	
DSONCAL	SALMEAS	The measured salinity before calibration	N	4.1	
DSONCAL	SPCDMEAS	Specific Conductance before calibration	N	4.1	
DSONCAL	DOMGMEAS	The measured DO concentration before calibration (mg/l)	N	4.1	
DSONCAL	PH7MEAS	The measured pH near 7 before calibration	N	4.1	
DSONCAL	PH10MEAS	The measured pH near 10 before calibration	N	4.1	
DSONCAL	DEPMEAS	The measured depth before calibration	N	4.1	
DSONCAL	SALCAL	The salinty measure following calibration	N	4.1	
DSONCAL	SPCDCAL	Specific Conductance after calibration	N	4.1	
DSONCAL	DOMGCAL	The concentration of DO after calbration	N	4.1	
DSONCAL	PH7CAL	The pH 7 measure after calibration	N	4.1	
DSONCAL	PH10CAL	The pH 10 measure after calibration	N	4.1	
DSONCAL	DEPCAL	The depth measure after calibration	N	4.1	
DSONCAL	DSCAL_BY	Person who calibrated the Data Sonde	C	20	
DSONCAL	SETUPNM	Name of the set up file	C	11	
DSONCAL	STRTDATE	Programmed day to start recording	MMDDYY	6	
DSONCAL	ENDDATE	Programmmed day to stop recording	MMDDYY	6	
DSONCAL	STRTIME	Programmed time to start recording	C	5	
DSONCAL	ENDTIME	Programmed time to stop recording	C	5	
DSONCAL	INCRMNT	Programmed increment to record DSonde	N	2	
DSONCAL	DSET_BY	Last name of the person who set up the Data Sonde	C	20	
DSONCAL	DOWNDATE	Date output was down loaded	MMDDYY	6	
DSONCAL	DOWNTIME	Time output was down loaded	C	5	
DSONCAL	DATALOG	Was data logging successful (Y/N)	C	1	
DSONCAL	DATATRAN	Was data successfully transferred (Y/N)	C	1	
DSONCAL	CMPFLNAM	The name of the file where data are stored	C	12	

DSONCAL	DNLODBY	Name of person who downloaded the file	C	20	
DSONCAL	DSCOM1	Data sonde comment 1	C	78	
DSONCAL	DSCOM2	Data Sonde comment 2	C	78	
DSONDUSE	SAMPLEID	Benthic Infauna Sample ID Number	N	12	Y1
DSONDUSE	EVNTDATE	Event Date	N	MMDDYY6	Y1
DSONDUSE	DSDEPTIM	Time unit was deployed for QC check	C	5	
DSONDUSE	DSERNUM1	Deployed unit serial number	C	12	Y2
DSONDUSE	PSERNUM1	Profiler serial number	C	12	Y2
DSONDUSE	BUSERNUM	Backup unit serial number	C	12	Y2
DSONDUSE	TEMPDEP1	Temperature of the deployed unit Predeployment	N	4.1	
DSONDUSE	SALDEP1	Salinity of deployed unit Predeployment	N	4.1	
DSONDUSE	SPCDDEP1	Specific Conductance of deployed Unit Predeloyment	N	4.1	
DSONDUSE	DOMGDEP1	Dissolved Oxygen concentration predeployment	N	4.1	
DSONDUSE	PHDEP1	pH of deployed unit predeployment	N	4.1	
DSONDUSE	DPTHDEP1	Depth of deployed unit predeployment	N	4.1	
DSONDUSE	TEMPPRO1	Temperature of profiler predeployment	N	4.1	
DSONDUSE	SALPRO1	Salinity of profiler predeployment	N	4.1	
DSONDUSE	SPCDPRO1	Specific Conductance profiler predeployment	N	4.1	
DSONDUSE	DOMGPRO1	Dissolved oxygen concentration profiler predeployment	N	4.1	
DSONDUSE	PHPRO1	pH of profiler predeployment	N	4.1	
DSONDUSE	DPTHPRO1	Depth of profiler predeployment	N	4.1	
DSONDUSE	TEMPBU1	Temperature of backup unit predeployment	N	4.1	
DSONDUSE	SALBU1	Salinity of backup unit predeployment	N	4.1	
DSONDUSE	SPCDBU1	Specific Conductance of backup unit predeployment	N	4.1	
DSONDUSE	DOMGBU1	DO mg/l of backup unit predeployment	N	4.1	
DSONDUSE	PHBU1	pH of backup unit predeployment	N	4.1	
DSONDUSE	DPTHBU1	Depth of backup unit predeployment	N	4.1	
DSONDUSE	PROFUSE	Profiler used 1 = profiler 2 = backup unit	N	4.1	
DSONDUSE	CALIBRAT	Was calibration required	C	1	
DSONDUSE	QC_BY1	name of person who did QC check	C	20	
DSONDUSE	ENTRYBY1	Name of person who did data entry	C	20	
DSONDUSE	WATRTIME	Time unit was deployed	C	5	
DSONDUSE	DSERNUM2	Deployed unit serial number	N	5	Y2
DSONDUSE	PSERNUM2	Profiler serial number	N	5	Y2
DSONDUSE	TEMPDEP2	Temperature of the deployed unit post deployment	N	4.1	
DSONDUSE	SALDEP2	Salinity of deployed unit post deployment	N	4.1	
DSONDUSE	SPCDDEP2	Dissolved Oxygen Percent saturation Predeloyment	N	4.1	
DSONDUSE	DOMGDEP2	Dissolved Oxygen concentration post deployment	N	4.1	
DSONDUSE	PHDEP2	pH of deployed unit post deployment	N	4.1	
DSONDUSE	DPTHDEP2	Depth of deployed unit post deployment	N	4.1	
DSONDUSE	TEMPPRO2	Temperature of profiler post deployment	N	4.1	
DSONDUSE	SALPRO2	Salinity of profiler post deployment	N	4.1	

DSONDUSE	SPCDPRO2	Specific Conductance of profiler post deployment	N		4.1	
DSONDUSE	DOMGPRO2	Dissolved oxygen concentration profiler post deployment	N		4.1	
DSONDUSE	PHPRO2	pH of profiler post deployment	N		4.1	
DSONDUSE	DPTHPRO2	Depth of profiler post deployment	N		4.1	
DSONDUSE	QC_BY2	Name of the person who did the QC post deployment	C		20	
DSONDUSE	ENTRYBY2	Name of the person who did the entry post deployment	C		20	
DSONDUSE	DSCOM1	Comment one	C		78	
DSONDUSE	DSCOM2	comment two	C		78	
FISHPATH	FTRAWLID	Fish Trawl ID Number	C		12	Y1
FISHPATH	EVNTDATE	Date samples were taken	N	MMDDYY		Y1
FISHPATH	SPECNUM	Arbitrary species number assigned to make unique ID numbers	N		4	Y1
FISHPATH	FSEQNUM	Arbitrary Fish Record Number ids fish on data sheet	N		3	Y1
FISHPATH	FISHLENG	The length of the fish in millimeters	N		5	
FISHPATH	SAVECODE	Code indicating why fish was saved.TR=Taxonomy reference; P = pathology; C=chemistry; PR = Patholgy reference	N		4	Y1
FISHPATH	LUMPS	Gross Path-Body Lump(s) (Y/N)	C		4	
FISHPATH	GROWTHS	Gross Path-Body Growth(s) (Y/N)	C		1	
FISHPATH	ULCERS	Gross Path-Ulcers (Y/N)	C		1	
FISHPATH	FINROT	Gross Path-Fin Erosion (Y/N)	C		1	
FISHPATH	SHELLDIS	Indicates if shell disease was observed (Y/N)	C		1	
FISHPATH	COTTDIS	Cotton Disease (Y/N)	C		1	
FISHPATH	OTHER	Other pathology observed (Y/N)	C		1	
FISHPATH	PATHCOM1	Comment on the pathology	C		1	
FISHPATH	PATHENTR	name of person who entered pathology data	C		1	
FTRAWL	FTRAWLID	Fish Trawl ID Number	C		12	Y2
FTRAWL	EVNTDATE	Event Date	MMDDYY		6	Y1
FTRAWL	STATION	Station at which trawl was conducted	C		10	Y1
FTRAWL	BEARING	Bearing when traw started	N		3	
FTRAWL	KNOTS	Speed of trawl in Knots	N		4.1	
FTRAWL	WTHCRNT	was trawl done with Current (Y/N)	C		1	
FTRAWL	FTRLCOM1	Comment Concerning Completed Fish Trawl	C		78	
FTRAWL	FTRLCOM2	Comment Concerning Completed Fish Trawl	C		78	
FTRAWL	FTRASH	Was trash observed in the trawl (Y/N)	C		1	
FTRAWL	FTRSHCOM	Description of the trash	C		78	
FTRAWL	FTB_TIME	Time when trawl started	C		5	
FTRAWL	FTBDEPTH	Depth of water at start of trawl in meters	N		4.1	
FTRAWL	FTBLTD	Degrees Latitude at start of trawl	N		3	
FTRAWL	FTBLTM	Minutes latitude at start of trawl	N		5.2	
FTRAWL	FTBLND	Degrees Longitude at start of trawl	N		3	
FTRAWL	FTBLNM	Minutes Longitudce at start of trawl	N		5.2	
FTRAWL	FTE_TIME	Time when trawl ended	C		5	
FTRAWL	FTEDEPTH	Depth of water at end of trawl	N		4.1	

FTRAWL	FTELTD	Degrees Latitude at end of trawl	N	3	
FTRAWL	FTELTM	Minutes latitude at end of trawl	N	5.2	
FTRAWL	FTELND	Degrees Longitude at end of trawl	N	3	
FTRAWL	FTELNM	Minutes Longitude at end of trawl	N	5.2	
FTRAWL	F_ENTRY	Person who entered trawl data	C	20	
FISHCNT	FTRAWLID	Fish Trawl ID Number	C	12	Y1
FISHCNT	SPECNUM	The arbitrary species number assigned in the field	N	2	Y2
FISHCNT	FTAXON	The taxon code a first four letters of the genus and first four letters of the species	C	8	Y1
FISHCNT	FCOUNT	Total count for the species	N	5	
FISHCNT	MEASTYPE	F= Fork Length;T = total length;S=Shrimp(rostrum to telson);C=Greatest Carapace Width; M=Squid mantle;D=Disk width for skates and Rays	C	1	
FISHCNT	SEX	Sex if it is pertinent, M=male, F=Female, I=Immature female, U=unknown	C	1	
FISHCNT	FLENG1	The length in millimeters of fish #1	N	5	
FISHCNT	FLENG2	The length in millimeters of fish #2	N	5	
FISHCNT	FLENG3	The length in millimeters of fish #3	N	5	
FISHCNT	FLENG4	The length in millimeters of fish #4	N	5	
FISHCNT	FLENG5	The length in millimeters of fish #5	N	5	
FISHCNT	FLENG6	The length in millimeters of fish #6	N	5	
FISHCNT	FLENG7	The length in millimeters of fish #7	N	5	Y1
FISHCNT	FLENG8	The length in millimeters of fish #8	N	5	
FISHCNT	FLENG9	The length in millimeters of fish #9	N	5	
FISHCNT	FLENG10	The length in millimeters of fish #10	N	5	
FISHCNT	FLENG11	The length in millimeters of fish #11	N	5	
FISHCNT	FLENG12	The length in millimeters of fish #12	N	5	
FISHCNT	FLENG13	The length in millimeters of fish #13	N	5	
FISHCNT	FLENG14	The length in millimeters of fish #14	N	5	
FISHCNT	FLENG15	The length in millimeters of fish #15	N	5	
FISHCNT	FLENG16	The length in millimeters of fish #16	N	5	
FISHCNT	FLENG17	The length in millimeters of fish #17	N	5	
FISHCNT	FLENG18	The length in millimeters of fish #18	N	5	
FISHCNT	FLENG19	The length in millimeters of fish #19	N	5	
FISHCNT	FLENG20	The length in millimeters of fish #20	N	5	
FISHCNT	FLENG21	The length in millimeters of fish #21	N	5	
FISHCNT	FLENG22	The length in millimeters of fish #22	N	5	
FISHCNT	FLENG23	The length in millimeters of fish #23	N	5	
FISHCNT	FLENG24	The length in millimeters of fish #24	N	5	
FISHCNT	FLENG25	The length in millimeters of fish #25	N	5	
FISHCNT	FLENG26	The length in millimeters of fish #26	N	5	
FISHCNT	FLENG27	The length in millimeters of fish #27	N	5	
FISHCNT	FLENG28	The length in millimeters of fish #28	N	5	
FISHCNT	FLENG29	The length in millimeters of fish #29	N	5	
FISHCNT	FLENG30	The length in millimeters of fish #30	N	5	
FISHCNT	FLENG31	The length in millimeters of fish #31	N	5	
FISHCNT	FLENG32	The length in millimeters of fish #32	N	5	
FISHCNT	FLENG33	The length in millimeters of fish #33	N	5	
FISHCNT	FLENG34	The length in millimeters of fish #34	N	5	

FISHCNT	FLENG35	The length in millimeters of fish #35	N		5	
FISHCNT	FLENG36	The length in millimeters of fish #36	N		5	
FISHCNT	FLENG37	The length in millimeters of fish #37	N		5	
FISHCNT	FLENG38	The length in millimeters of fish #38	N		5	
FISHCNT	FLENG39	The length in millimeters of fish #39	N		5	
FISHCNT	FLENG40	The length in millimeters of fish #40	N		5	
HYPROFIL	SAMPLEID	The sample identification for the hydrographic profile	C		12	Y1
HYPROFIL	EVNTDATE	The date of the Hydrographic profile	MMDDYY		6	Y1
HYPROFIL	STRTTIME	The time the profile was started	C		5	
HYPROFIL	ENDTIME	The time the profile was ended	C		5	
HYPROFIL	DSERNUM	The serial number of the profiler	C		12	Y2
HYPROFIL	SECDEPTH	The secci depth in meters	N		4.1	
HYPROFIL	SEC_BY	Last name of person who performed the Secci Depth	C		15	
HYPROFIL	SEC_TIME	Time the secci depth was measured	C		5	
HYPROFIL	HPENTRY	Last name of person who recorded the profile data	C		18	
HYPROFIL	HPCOMPIN	Last name of the person who entered the profile into the computer	C		19	
HYPROFIL	HPCOM1	Comment line one for Hydrographic Profile	C		78	
HYPROFIL	HPCOM2	Comment line two Hydrographic Profile	C		78	
HYPROFIL	HPCOM3	Comment line three Hydrographic Profile	C		78	
HYPRODET	DEP	Depth at which the record was recorded	N		4.1	Y1
HYPRODET	TEM	Temperature Measured at the depth deg C	N		4.1	
HYPRODET	PH	pH measured at the depth	N		4.1	
HYPRODET	SPECCOND	Specific Conductivity at the depth	N		4.1	
HYPRODET	HPDOMGL	Concentration of Dissolved oxygen	N		4.1	
HYPRODET	HPSAL	Salinity measured at the depth in o/oo	N		4.1	
			C		-40	
QA_CODES	QACODE	Quality Assurance Code Related to Data				
QA_CODES	CODDESC1	QA Code Description (#1)	C		-6	Y1
QA_CODES	CODDESC2	QA Code Description (#2)	C		-40	
QA_CODES	CODDESC3	QA Code Description (#3)	C		-40	
QA_CODES	CODDESC4	QA Code Description (#4)	C		-40	
			C		-40	
SAMPLOG	REC_COND	Condition of Sample when Received				
SAMPLOG	SAMPLEID	Sample Identification Number	C		16	
SAMPLOG	EVNTNUM	Event Number	N			Y1
SAMPLOG	EVNTDATE	Event Date	N		6	Y2
SAMPLOG	SAMPTYPE	Code for Sample Type	N	YYMMDD		Y2
SAMPLOG	SHIPNUM	Shipment in which Sample was Sent	C		6	
SAMPLOG	SAMPSTAT	Status of Sample	N			
SEDCOMP	STATION	Station at which composites were gathered	C		10	Y1
SEDCOMP	EVNTDATE	Date of Sampling Event	N		6	Y1
SEDCOMP	QASAMP	Where QA/QC samples taken	C		1	
SEDCOMP	COMPSTRT	Time compositing was started	C		5	
SEDCOMP	COMPEND	Time copositing ended	C		5	

SEDCOMP	HOMGRAB	Grabs in Homogenized Sediment Sample (#)	N	2	
SEDCOMP	HOMFAIL	Unsuccessful Grabs (#)	N	2	
SEDCOMP	SCENTRY	Last name of person who entered the data in the field	C	20	
SEDCOMP	SCOMPENT	Last name of person who entered the data in the field	C	20	
SEDCOMP	COMPCOM1	Comment on Composite process line 1	C	78	
SEDCOMP	COMPCOM2	Comment on Composite process line 2	C	78	
SEDCOMP	COMPCOM3	Comment on Composite process line 3	C	78	
SEDCNTSM	EXPTNUM	Experiment Number (YYMMDD)	N		Y1
SEDCNTSM	MNPCMT_C	Mean % Mortality-Control Replicates	N		
SEDCNTSM	SDPCMT_C	Stand. Dev. of Mean % Mort.-Control Reps	N		
SEDCNTSM	NUM_CONS	Number of Control Replicates	N		
SEDCNTSM	SPECCODE	Sediment Toxicity Test Species Code	C	8	Y1
SEDQA	STATION	Station at which trawl was conducted	C	10	Y1
SEDQA	EVNTDATE	Date of Sampling Event	N	6	Y1
SEDQA	QASAMP	Where QA/QC samples taken	C	1	
SEDQA	QASTRT	Time compositing was started	C	5	
SEDQA	QAEND	Time copositing ended	C	5	
SEDQA	QAENTRY	Last name of person who entered the data in the field	C	20	
SEDQA	QACOMPIN	Last name of person who entered the data in the field	C	20	
SEDQA	COMPCOM1	Comment on Composite process line 1	C	78	
SEDQA	COMPCOM2	Comment on Composite process line 2	C	78	
SEDQA	COMPCOM3	Comment on Composite process line 3	C	78	
SED_RAW	SAMPLEID	Sediment Toxicity Sample ID Number	N		Y1
SED_RAW	SPECCODE	Sediment Toxicity Test Species Code	C	($8)	Y2
SED_RAW	EXPTNUM	Experiment Number (YYMMDD)	N		Y2
SED_RAW	REPNUM	Control Replicate Number	N		Y1
SED_RAW	NUM_ANIM	Number of Live Animals at Test Start	N		
SED_RAW	PCMT_REP	Mortality in Control Replicate (%)	N		
SED_RAW	QACODE	Quality Assurance Code for Sample	C	($9)	
SAMPTRAK	SHIPNUM	EMAP Shipment Number	C	10	Y1
SAMPTRAK	SHIPPER	Name of the shipping company	C	10	Y1
SAMPTRAK	INFAUNA	Were infaunal samples included (Y?N)	C	1	
SAMPTRAK	ORGANIC	Were Organic samples included (Y?N)	C	1	
SAMPTRAK	METALS	Were metals samples included (Y?N)	C	1	
SAMPTRAK	AMPHTOX	Were Ampipod toxicity samples included (Y?N)	C	1	
SAMPTRAK	MICROTOX	Were Microtox samples included (Y?N)	C	1	
SAMPTRAK	TOC	Were Total Org Carbon samples included (Y?N)	C	1	
SAMPTRAK	FISH	Were fish samples included (Y?N)	C	1	
SAMPTRAK	SEDCHAR	Were Sediment Characterization samples included (Y?N)	C	1	
SAMPTRAK	FROZEN	Were samples frozen(Y?N)	C	1	

SAMPTRAK	COOL	Were samples shipped cooled (on ice)(Y?N)	C	1	
SAMPTRAK	FORMALIN	Were samples in formalin(Y?N)	C	1	
SAMPTRAK	DIETRICH	Were samples dietrichs(Y?N)	C	1	
SAMPTRAK	OTHER	was other preservation used(Y?N)	C	1	
SAMPDET	SHIPNUM	EMAP Shipment Number	C	10	Y1
SAMPDET	SAMPLEID	Sample Id Number	C	16	Y1
SAMPDET	SHIPCOM	Comment regarding the sample line 1	C	78	
SHIPMENT	SHIPNUM	EMAP Shipment Number	C	10	Y1
SHIPMENT	PACK_ID	Shipper's Id number for the package	C	15	Y1
SHIPMENT	CARRIER	carrier used to ship the sample	C	10	
SHIPMENT	SENTBY	Last Name of person relinquishing package	C	10	Y2
SHIPMENT	OUTDATE	Date package was sent	MMDDYY	6	
SHIPMENT	OUTTIME	time package was sent	C	5	
SHIPMENT	GOTBY	Last name of person who received the package	C	10	
SHIPMENT	INDATE	Date package was received	MMDDYY	6	
SHIPMENT	INTIME	Time Package was received	C	5	
SPECLIST	NAME	Taxonomic Name	C	35	
SPECLIST	PHYLUM	Phylum	C	35	
SPECLIST	GROUP	Taxonomic Group	C	16	
SPECLIST	FAMILY	Family	C	15	
SPECLIST	GENUS	Genus	C	20	
SPECLIST	SPECIES	Species	C	20	
SPECLIST	CODBIOST	BioStoret Taxonomic Code	C	20	
SPECLIST	COD_EMAP	EMAP Taxonomic Code	C	17	Y1
			N		
STATIONS	STA_AREA	Station's Statistical Area (sq. km)			
STATIONS	STATION	Station Name	C	10	
STATIONS	STA_LATD	Latitude: degrees	C	-8	Y1
STATIONS	STA_LATM	Latitude: minutes	N	3	
STATIONS	STA_LATS	Latitude: seconds	N	2	
STATIONS	STA_LNGD	Longitude: degrees	N	5.2	
STATIONS	STA_LNGM	Longitude: minutes	N	3	
STATIONS	STA_LNGS	Longitude: seconds	N	2	
STATIONS	STA_SYS	System in which Station is located	N	5.2	
STATIONS	STA_SIZE	Station Size Classification	C	-8	
STATIONS	STA_ESTU	Estuary Code	C	-6	
STATIONS	STASTATE	State (2 letter postal code)	N		
STATIONS	STA_HEX	EMAP Hexagon Number	C	-2	
STATIONS	STA_INPB	EMAP Inclusion Probability	N	12.3	
STATIONS	STA_CLAS	Station Classification	N	6.4	
STATIONS	SIBLING	Sibling Station (for index stations)	C	-18	
STATIONS	EMAPYEAR	Year During Which Data were Collected	C	-8	
			N		Y1

Appendix C - D2 Data Dictionary

The table below describes the attributes (fields) for each entity (table) in the D2 data base.

VARTYPE = Indicates the type of variable; C = Character, N = Numeric,.
VARFMT = Format of the field; MMDDYY = Date numeric with a width of 6;
for character field the number indicates the width of the field;
for numeric fields if there is a number alone in the format column
then the field is an integer of the width given in the format column.
If the VARFMT is given as Fx.y then the number is a real number
with a width of x and y decimal places.
KEYFIELD = Indicates if the field is a key field (Y1) which means the field is part
of the unique identification for a record In the entity. If the
KEYFIELD contains a Y2 then the field is a foreign key which
means it will be regularly used to cross reference the record in this
entity with records in other entities.

DATASET	VARNAME	VARLABL	VARTYPE	VARFMT	KEYFIELD
ABUNDANC	SAMPLEID	Benthic Infauna Sample Id. Number	C	12	Y1
ABUNDANC	SIEVE_MM	Sieve size (mm)	N	3.1	Y1
ABUNDANC	ABUNDANC	Taxon Abundance (# / Sample)	N	5	
ABUNDANC	SPEC_IGN	Flag: if 1 Ignore Taxon for # Species	C	1	
ABUNDANC	COD_EMAP	EMAP Taxonomic Code	C	8	Y1
ABUNDANC	CODE_EMP	Laboratory working Taxonomic code if different from COD_EMAP			
ABUNDANC	EMAPYEAR	Year During Which Data were Collected	N	4	Y1
ANALSET	ANALSET	Set ID (or batch number) for a Group of Chem Samples	C	10	1
ANALSET	ANALMETH	Method of Chemistry Analysis (see acceptable values below)	C	10	12
ANALSET	PREPDATE	Date Set Prepared for Analysis (YYMMDD)	YYMMDD	6	23
ANALSET	CHEMIST	Person Performing Analysis (Initials)	C	10	30
ANALSET	CHMLABID	Lab Performing Analysis (ID created by laboratory)	C	10	41
ANALYTES	ANALYTE	Chemical Analyte Code	C	10	Y1
ANALYTES	CHEMNAME	Full Chemical Name	C	40	
ANALYTES	CASNUM	CAS Number	C	8	
BENINF	SAMPLEID	Benthic Infauna Sample ID Number	C	12	Y2
BENINF	EVNTDATE	Event Date	N	YYMMDD6	Y1
BENINF	BENSEQ	Grab Associated with Infauna Sample (#)	N	2	Y1
BENINF	BENTIME	Time grab was collected	N	5	
BENINF	BENCOLOR	Benthic Sediment Dominant Color	C	15	
BENINF	BENTYPE	Benthic Sediment Dominant typeType	C	15	
BENINF	BENSMELL	Benthic Sediment Smell	C	15	
BENINF	BENCOM1	Benthic Grab Comments 1	C	78	
BENINF	BENCOM2	Benthic Grab Comments 2	C	78	

BENINF	BENCOM3	Benthic Grab Comments 3	C	78
BENINF	BENCOM4	Benthic Grab Comments 4	C	78
BENINF	BENNONE	No visible biology on surface	C	1
BENINF	BENTUBES	Worm Tubes found on surface Sediment	C	1
BENINF	BENCRUST	Crustaceans found on surface Sediment	C	1
BENINF	BENCLAM	Molluscs found on surface of sediment	C	1
BENINF	BENVEG	Vegetation found in Benthic Sediment	C	1
BENINF	BENALGAE	Molluscs found in Benthic Sediment	C	1
BENINF	BENBIOTH	Other Infauna found in Benthic Sediment	C	1
BENINF	BNLATDG	Degrees latitude where sample was taken	N	3
BENINF	BNLATMN	Minutes latitude where sample was taken	N	5
BENINF	BNLONDG	Degrees Longitude where sample was taken	N	3
BENINF	BNLONMN	Minutes Longitude where sample was taken	N	5
BENINF	JARS	Number of Jars needed for samples	N	1
BENINF	WATRDEPT	Depth of water where sample was taken	N	4
BENSUMRY	EVNTNUM	Event Number	N	6 Y1
BENSUMRY	EVNTDATE	Date of Event	N	YYMMDD6
BENSUMRY	N_ABUN	# Grabs Analyzed, Abundance data	N	2
BENSUMRY	ABUN_INF	Mean Abundance per grab, All Infauna	N	7.1
BENSUMRY	ABUN_EPI	Mean Abundance per grab, All Epifauna	N	7.1
BENSUMRY	ABUN_OPP	Mean abun./grab Opportunisitic Species	N	7.1
BENSUMRY	ABUNSUSP	Mean abun./grab Suspension Feeders	N	7.1
BENSUMRY	ABUNDEPO	Mean abun./grab Deposit Feeders	N	7.1
BENSUMRY	ABUNOMNI	Mean abun./grab Omnivore/Carnivores	N	7.1
BENSUMRY	ABUNAMPH	Mean abun./grab Amphipods	N	7.1
BENSUMRY	ABUN_BIV	Mean abun./grab Bivalves	N	7.1
BENSUMRY	ABUNGAST	Mean abun./grab Gastropods	N	7.1
BENSUMRY	ABUNPOLY	Mean abun./grab Polycheates	N	7.1
BENSUMRY	ABUN_CAP	Mean abun./grab Capitellids	N	7.1
BENSUMRY	ABUNSPIO	Mean abun./grab Spionid Polychaetes	N	7.1
BENSUMRY	ABUN_TUB	Mean abun./grab Tubificid Oligochates	N	7.1
BENSUMRY	TNSP_INF	Total number of Infauna Species	N	3
BENSUMRY	TNSP_EPI	Total number of Epifauna Species	N	3
BENSUMRY	MNSP_INF	Mean number of Infauna Species per Grab	N	5.1
BENSUMRY	MNSP_EPI	Mean number of Epifauna Species per Grab	N	5.1
BENSUMRY	BEN_SHAN	Shannon-Weiner Index-Benthic Community	N	5.2
BENSUMRY	BENIND94	Benthic Index (CP 1994 calculation)	N	5.2
BENSUMRY	EMAPYEAR	Year During Which Data were Collected	N	4 Y1
BOATLOC	LAUNCH	launch site for for second visit	C	15
BOATLOC	BOATNAME	Name of the boat used in sampling	C	15
BOATLOC	DSONDRET	Indicates if Datasonde was recovered	C	1
BOATLOC	DSONDDEP	Indicates if the Data Sonde was deployed	C	1
BOATLOC	SAMP	Indicates if samples were taken on visit	C	1
BOATLOC	LRNLATDG	Loran latitude degrees	N	3
BOATLOC	LRNLATMN	Loran Latitude decimal minutes	N	5.2
BOATLOC	LRNLONDG	Loran longitude degrees	N	3

BOATLOC	LRNLONMN	Loran longitude decimal minutes	N	5.2	
BOATLOC	GPSLATDG	GPS latitude degrees	N	3	
BOATLOC	GPSLATMN	GPS Latitude decimal minutes	N	5.2	
BOATLOC	GPSLONDG	GPS longitude degrees	N	3	
BOATLOC	GPSLONMN	GPS longitude decimal minutes	N	5.2	
BOATLOC	TD1	Loran time delay 1	N	8.2	
BOATLOC	TD2	Loran time delay 2	N	8.2	
BOATLOC	LOC_AUTH	instrument authority for locating sampling	C	5	
BOATLOC	CRWCHIEF	Captain at time of sampling	C	25	Y2
BOATLOC	CRWMEMB1	Crew member 1 at time of sampling	C	25	Y2
BOATLOC	CRWMEMB2	Crew member 2 at time of sampling	C	25	Y2
BOATLOC	CRWMEMB3	Crew member 3 at time of sampling	C	25	Y2
BOATLOC	EVNTDATE	Event Date	N	YYMMDD	Y1
BOATLOC	BEGTIME	Time of Beginning of Sampling Event	C	5	
BOATLOC	TRASH	Trash Present at Station (Y/N)	C	1	
BOATLOC	OILSLICK	Oil Slick on Water at Station (Y/N)	C	1	
BOATLOC	WTH_SUN	Weather Conditions--Sunny (Y/N)	C	1	
BOATLOC	WTH_PSUN	Weather Conditions--Partly Sunny (Y/N)	C	1	
BOATLOC	WTH_OCST	Weather Conditions--Overcast (Y/N)	C	1	
BOATLOC	WTH_RAIN	Weather Conditions--Rainy (Y/N)	C	1	
BOATLOC	WTH_WIND	Weather Conditions--Windy (Y/N)	C	1	
BOATLOC	WTH_FOG	Weather Conditions--Windy (Y/N)	C	1	
BOATLOC	SCNDCALM	Sea Condition Calm (Y/N)	C	1	
BOATLOC	SCNDCHOP	Sea Condition Choppy (Y/N)	C	1	
BOATLOC	SCND_RUF	Sea Condition rough (Y/N)	C	1	
BOATLOC	TRASHCOM	Description of the trash	C	78	
BOATLOC	STNCOM1	Station comment 1	C	78	
BOATLOC	STNCOM2	Station comment 2	C	78	
BOATLOC	STAMOVED	Was the Station Moved? (Y/N)	C	1	
BOATLOC	ENDTIME	Time Sampling Event Ended	C	5	
BOATLOC	VISITORS	Visitors on the boat on day of sampling	C	53	
CATALOG	NODE	Node Which Data Set Sits On	C	10	
CATALOG	PROJECT	Project Which Generated Data	C	15	
CATALOG	DATASET	SAS File Name	C	20	
CATALOG	MEDIUM	Data Concentration: Air, Water, Salt...	C	20	
CATALOG	NUM_RECS	Number of Records in Data Set	N	5	
CATALOG	NUM_VARS	Number of Variables in Data Set	N	3	
CATALOG	NUM_YRS	Number of Years the Data Set Covers	N	2	
CATALOG	FRSTYEAR	Year Samples were First Taken	N	4	
CATALOG	LASTYEAR	Year Last Samples Taken - If Static	N	4	
CATALOG	STATUS	Is Data Set Static or Dynamic?	C	3	
CATALOG	UPDATED	Date of Last Update of the Data Set	N	DATETIME	16
CATALOG	QACODE	Perceived Quality of the Data	C	8	
CATALOG	SET_FILE	File Spec. for On-Line Data Set Doc.	C	60	
CATEGORY	CON_ID	Contact Identification Number	N	5	
CATEGORY	CON_CAT	Contact Mailing List Category	C	10	

CHEM_IS	ANALSET	Set ID for a Group of Chem Samples	C	10		1
CHEM_IS	CHEMID	QA Sample ID (Internal to the analytical laboratory. this number must be an analytical chemistry ID number since the internal standard is injected into an existing sample)	C	10		12
CHEM_IS	ANALYTE	Code for Analyte Measured	C	10		23
CHEM_IS	QARESULT	Numeric Result	N	10.5		34
CHEM_IS	CHMUNITS	Unit of Measure	C	10		45
CHEM_IS	ANALDATE	Date of Analysis	YYMMDD	6		56
CHEMLOG	SAMPLEID	Sample ID Number Related to Sample Type	N	8.1	Y2	
CHEMLOG	ANALSET	Set ID for a Group of Chem Samples	C	10	Y1	
CHEMLOG	CHEMID	Chemistry Sample ID Number (Internal)	C	10	Y1	
CHEMLOG	WETWGHT	Wet Weight of Sample (g)	N	6.4		
CHEMLOG	DRYWGHT	Dry Weight of Sample (g)	N	6.4		
CHEMLOG	MATRIX	Type of Material Analyzed	C	12		
CHEMLOG	EMAPYEAR	Year During Which Data were Collected	N	4	Y1	
CHEMQA	ANALSET	Set ID for a Group of Chem Samples	C	10		1
CHEMQA	QACHEMID	QA Sample ID (Internal to analytical laboratory. If a field sample is used for analysis and independent spike, the sample CHEMID and QACHEMID can be the same or different)	C	10		1
CHEMQA	ANALYTE	Code for Analyte Measured	C	10		1
CHEMQA	QA_TYPE	Code for QA Sample Type	C	10		1
CHEMQA	QARESULT	QA Sample Analysis Numeric Result	N	10.5		1
CHEMQA	CHMUNITS	Unit of Measure	C	10		1
CHEMQA	LCMNAME	Name of Lab Control Material Used	C	10		1
CHEMQA	QACODE	Chemical Analysis QA Code	C	4		2
CHEMQA	ANALDATE	Date of Analysis	YYMMDD	6		2
CHEMRES	ANALSET	Analysis Set Id.	C	10	Y1	
CHEMRES	CHEMID	Chemistry Sample ID Number (Internal)	C	10	Y1	
CHEMRES	ANALYTE	Code for Analyte Measured	C	10	Y1	
CHEMRES	CONC	Concentration of Analyte in Sample	N	10.5		
CHEMRES	CHMUNITS	Concentration Units of Measure	C	10		
CHEMRES	QACODE	Chemical Analysis QA Code	C	4	Y2	
CHEMRES	MDL	Method Detection Limit	N	10.5		
CHEMRES	ANALDATE	Date of Analysis	N	YYMMDD	Y2	
CHEMRES	SUBSETNO	Analysis Set Sub-set Number	N	5		
CHEMRES	EMAPYEAR	Year During Which Data were Collected	N	4	Y1	

CONTACTS	NODE	Node Which Data Set Sits On	C	20	
CONTACTS	PROJECT	Project Which Generated Data	C	15	
CONTACTS	DATASET	SAS File Name	C	20	
CONTACTS	CON_ID	Contact Identification Number	N	5	
CONTACTS	CON_TYPE	Type of Contact: DBA, DL, QAO	C	10	
CONTACTS	CON_COMM	Comment Field Relating to Contact	C	40	
DICT	NODE	Node Which Data Set Sits On	C	10	
DICT	PROJECT	Project Which Generated Data	C	15	
DICT	DATASET	SAS File Name	C	20	
DICT	VARNAME	Variable Name	C	8	
DICT	VARLABL	Variable Label	C	40	
DICT	VARSHARE	Variable exists on Multiple Files?	C	1	
DICT	VARTYPE	Variable Data Type	C	4	
DICT	VARFMT	Variable Format	C	10	
DICT	VARNUM	Variable Number within dataset	N	3	
DICT	KEYFIELD	Key field in dataset	C	3	
DICT	VALUESET	File name of field code resol. (if any)	C	40	
DICT	VARFILE	File Spec. of doc on detailed field info	C	60	
DIRECT	NODE	Node Which Data Set Sits On	C	10	
DIRECT	PROJECT	Project Which Generated Data	C	15	
DIRECT	DATASET	SAS File Name	C	20	
DIRECT	LIBRARY	Library Name in Which the Data Resides	C	40	
DIRECT	LOG_LIB	Logical Directory Name for Library	C	10	
DIRECT	DSTYPE	Type of Data: Data, View, Ascii File	C	10	
DIRECT	ACCESS	Lowest Access Code with Read Access	C	10	
DIRECT	FILEDESC	Description of Dataset	C	40	
DOMSHELL	SEQNUM	Record Number for Hydrolab Measurements	N	5.2	
DOMSHELL	DATE	Date of Hydrolab Measurements	N	5.2	
DOMSHELL	TIME	Time of Hydrolab Measurements	N	5.2	
DOMSHELL	TEMP	Temperature (Deg C)	N	5.2	
DOMSHELL	PH	pH (pH units)	N	5.2	
DOMSHELL	SPCOND	Conductivity (mS/cm)	N	5.2	
DOMSHELL	SALIN	Salinity (ppt)	N	5.2	
DOMSHELL	PCTDO	Dissolved Oxygen (% saturation)	N	5.2	
DOMSHELL	DO	Dissolved Oxygen (mg/l)	N	5.2	
DOMSHELL	DEPTH	Depth of Measurements (m)	N	5.2	
DOMSHELL	BATT	Battery Reading (volts)	N	5.2	
DO_SUM	SAMPLEID	Sample ID Number Related to Sample Type	C	12	Y1
DO_SUM	DSSERNUM	Data sonde serial number used to collect these data	C	12	Y2
DO_SUM	DOSFNAME	File Name of Original Data	C	12	
DO_SUM	VALFNAME	File Name of Validated data	C	13	
DO_SUM	STATION	Station Identifier	C	8	Y2
DO_SUM	QACODE	Status code(s) for Hydrolab Data File	C	15	
DO_SUM	TTLRECS	Total Data Records in Deployment (#)	N	4	

DO_SUM	DELRECS	Data Records Deleted by Analyst	N	4	
DO_SUM	FRSTDATE	Start Date of Acceptable Data (MMDDYY)	N	6	
DO_SUM	FRSTTIME	Start Time of Acceptable Data (HHMMSS)	N	6	
DO_SUM	LASTDATE	End Date of Acceptable Data (MMDDYY)	N	6	
DO_SUM	LASTTIME	Time of Last Acceptable Data	N	6	
DO_SUM	HYD_INT	Time Interval between Records (HHMMSS)	N	6	
DO_SUM	EMAPYEAR	Year During Which Data were Collected	N	4	Y1
DO_SUM	MIN_DOMG	Minimum Dissolved Oxygen concentration in the file	N	5.2	
DO_SUM	MAX_DOMG	Maximum Dissolved Oxygen concentration in the file	N	5.2	
DO_SUM	MIN_DOPC	Minimum Dissolved Oxygen concentration in % saturation	N	5.2	
DO_SUM	MIN_PH	Minimum pH measured	N	5.1	
DO_SUM	MAX_PH	Maximum pH measured	N	5.1	
DO_SUM	MAX_DOPC	Maximum Dissolved Oxygen concentration in % saturation	N	5.2	
DO_SUM	MIN_TEMP	Minimum temperature in the file	N	5.2	
DO_SUM	MAX_TEMP	Maximum temperature in the file	N	5.2	
DO_SUM	MIN_SAL	Minimum salinity in the file	N	5.2	
DO_SUM	MAX_SAL	Maximum salinity concentration in the file	N	5.2	
DO_SUM	MINDEPTH	Minimum depth in the file	N	5.2	
DO_SUM	MAXDEPTH	Maximum depth in the file	N	5.2	
EVENTLOG	EVNTNUM	Event Number	N	6	Y1
EVENTLOG	STATION	Station Identifier	C	8	Y2
EVENTLOG	EVNTCREW	Crew Conducting Sampling Event (#)	N	4	
EVENTLOG	VISDATE1	Date of First Visit	N	YYMMDD	
EVENTLOG	VISDATE2	Date of Second Visit	N	YYMMDD	
EVENTLOG	VISDATE3	Date of Third Visit	N	YYMMDD	
EVENTLOG	VISDATE4	Date of Fourth Visit	N	YYMMDD	
EVENTLOG	VISCOUNT	Number of Visits during Event	N		
EVENTLOG	EMAPYEAR	Year in which Data were Collected	N		Y1
FISH_CNT	SAMPLEID	Fish Trawl ID Number	C	12	Y1
FISH_CNT	COD_EMAP	Fish Species-Taxon Code	C	8	Y1
FISH_CNT	SPECNUM	Arbitrary species number assigned to make unique ID numbers for each trawl (may nopt be the same among trawls).	N	4	Y1
FISH_CNT	F_COUNT	Total Fish/Species (#)	N	6	
FISH_CNT	CNTESTIM	Was the Fish Count Estimated? (1=Y, 0=N)	N		
FISH_CNT	EMAPYEAR	Year During Which Data were Collected	N		Y1
FISHPATH	SAMPLEID	Fish Trawl ID Number	C	12	Y1
FISHPATH	EVNTDATE	Date samples were taken	N	MMDDYY	Y1
FISHPATH	COD_EMAP	Fish Species-Taxon Code	C	8	Y1
FISHPATH	FSEQNUM	Arbitrary Fish Record Number ids fish on data sheet	N	3	Y1
FISHPATH	FISHLENG	The length of the fish in millimeters	N	5	
FISHPATH	SAVECODE	Code indicating why fish was saved.TR=Taxonomy reference; P = pathology; C=chemistry; PR = Patholgy reference	N	4	Y1
FISHPATH	LUMPS	Gross Path-Body Lump(s) (Y/N)	C	4	
FISHPATH	GROWTHS	Gross Path-Body Growth(s) (Y/N)	C	1	

FISHPATH	ULCERS	Gross Path-Ulcers (Y/N)	C	1	
FISHPATH	FINROT	Gross Path-Fin Erosion (Y/N)	C	1	
FISHPATH	SHELLDIS	Indicates if shell disease was observed (Y/N)	C	1	
FISHPATH	COTTDIS	Cotton Disease (Y/N)	C	1	
FISHPATH	OTHER	Other pathology observed (Y/N)	C	1	
FISHPATH	PATHCOM1	Comment on the pathology	C	1	
FISHPATH	PATHENTR	name of person who entered pathology data	C	1	
FISHLEN	SAMPLEID	Fish Trawl ID Number	N	12	Y1
FISHLEN	COD_EMAP	Fish Species-Taxon Code	C	8	Y1
FISHLEN	FSEQNUM	Fish Record Number	N	3	Y1
FISHLEN	F_LENGTH	Fish Fork Length (mm)	N	5	
FTRAWL	SAMPLEID	Fish Trawl ID Number	C	12	Y2
FTRAWL	EVNTDATE	Event Date	MMDDY Y	6	Y1
FTRAWL	STATION	Station at which trawl was conducted	C	10	Y1
FTRAWL	BEARING	Bearing when traw started	N	3	
FTRAWL	KNOTS	Speed of trawl in Knots	N	4.1	
FTRAWL	WTHCRNT	was trawl done with Current (Y/N)	C	1	
FTRAWL	FTRLCOM1	Comment Concerning Completed Fish Trawl	C	78	
FTRAWL	FTRLCOM2	Comment Concerning Completed Fish Trawl	C	78	
FTRAWL	FTRASH	Was trash observed in the trawl (Y/N)	C	1	
FTRAWL	FTRSHCOM	Description of the trash	C	78	
FTRAWL	FTB_TIME	Time when trawl started	C	5	
FTRAWL	FTBDEPTH	Depth of water at start of trawl in meters	N	4.1	
FTRAWL	FTBLTD	Degrees Latitude at start of trawl	N	3	
FTRAWL	FTBLTM	Minutes latitude at start of trawl	N	5.2	
FTRAWL	FTBLND	Degrees Longitude at start of trawl	N	3	
FTRAWL	FTBLNM	Minutes Longitudce at start of trawl	N	5.2	
FTRAWL	FTE_TIME	Time when trawl ended	C	5	
FTRAWL	FTEDEPTH	Depth of water at end of trawl	N	4.1	
FTRAWL	FTELTD	Degrees Latitude at end of trawl	N	3	
FTRAWL	FTELTM	Minutes latitude at end of trawl	N	5.2	
FTRAWL	FTELND	Degrees Longitude at end of trawl	N	3	
FTRAWL	FTELNM	Minutes Longitude at end of trawl	N	5.2	
FULLSED	SAMPLEID	Sample ID Number Related to Sample Type	N	12	Y1
FULLSED	SAND	Sand Content (%)	N	4.1	
FULLSED	SILT	Silt Content (%)	N	4.1	
FULLSED	CLAY	Clay Content (%)	N	4.1	
FULLSED	SILTCLAY	Silt-Clay Content (%)	N	4.1	
FULLSED	Q1_PHI	25% Quartile Diameter (Phi)	N	4.1	
FULLSED	MED_DIAM	Median Diameter (Phi)	N		
FULLSED	Q3_PHI	75% Quartile Diameter (Phi)	N		
FULLSED	QUARTDEV	Phi Quartile Deviation (Folk 1974)	N		
FULLSED	SKEWNESS	Phi Quartile Skewness (Folk 1974)	N		
FULLSED	EMAPYEAR	Year During Which Data were Collected	N		Y1
FULLSED	MOISTURE	Moisture Content (%)	N		

HYDDEP	EVNTNUM	Event Number	N	6	Y2
HYDDEP	SAMPLEID	Sample ID Number Related to Sample Type	N	12	Y1
HYDDEP	EQUIP_ID	Hydrolab Equipment ID Number	N	6	Y3
HYDDEP	HLD_DATE	Date of HydroLab Deployment	N	YYMMDD6	Y2
HYDDEP	HLD_TIME	Time of HydroLab Deployment	N		
HYDDEP	HLD_LATD	Deployment Location-Degrees Latitude	N	3	
HYDDEP	HLD_LATM	Deployment Location-Minutes Latitude	N	5.2	
HYDDEP	HLD_LATS	Deployment Location-Seconds Latitude	N	5.2	
HYDDEP	HLD_LNGD	Deployment Location-Degrees Longitude	N	3	
HYDDEP	HLD_LNGM	Deployment Location-Minutes Longitude	N	5.2	
HYDDEP	HLD_LNGS	Deployment Location-Seconds Longitude	N	5.2	
HYDDEP	EMAPYEAR	Year During Which Data were Collected	N		Y1
HYDRET	EVNTNUM	Event Number	N	6	Y2
HYDRET	SAMPLEID	Sample ID Number Related to Sample Type	N		Y1
HYDRET	EQUIP_ID	Hydrolab Equipment ID Number	N	6	Y3
HYDRET	HLR_DATE	Hydrolab Retrieval Date	N	YYMMDD	Y2
HYDRET	HLR_TIME	Hydrolab Retrieval Time HHMM	N	4	
HYDRET	HLR_LATD	Retrieval Location-Degrees Latitude	N	3	
HYDRET	HLR_LATM	Retrieval Location-Minutes Latitude	N	5.2	
HYDRET	HLR_LATS	Retrieval Location-Seconds Latitude	N	5.2	
HYDRET	HLR_LNGD	Retrieval Location-Degrees Longitude	N	3	
HYDRET	HLR_LNGM	Retrieval Location-Minutes Longitude	N	5.2	
HYDRET	HLR_LNGS	Retrieval Location-Seconds Longitude	N	5.2	
HYDRET	EMAPYEAR	Year During Which Data were Collected	N		Y1
HYPRODET	SAMPLEID	Sample ID Number Related to Sample Type	N		Y1
HYPRODET	DEPTH	Depth in meters at which the measurement was made	N	4.1	
HYPRODET	DOMGL	Dissolved Oxygen Concentration as mg/l	N	4.1	
HYPRODET	PH	pH.	N	4.1	
HYPRODET	SAL	Salinity.	N	4.1	
HYPRODET	SPECCOND	The specific conductance.	N	4.1	
HYPRODET	TEMP	Temperature.	N	4.1	
HYPROFIL	SAMPLEID	The sample identification for the hydrographic profile	C	12	Y1
HYPROFIL	EVNTDATE	The date of the Hydrographic profile	MMDDY Y	6	Y1
HYPROFIL	STRTTIME	The time the profile was started	C	5	
HYPROFIL	ENDTIME	The time the profile was ended	C	5	
HYPROFIL	DSSERNUM	The serial number of the profiler	C	12	Y2
HYPROFIL	SECDEPTH	The secci depth in meters	N	4.1	
HYPROFIL	SEC_TIME	Time the secci depth was measured	C	5	
HYPROFIL	HPCOM1	Comment line one for Hydrographic Profile	C	78	
HYPROFIL	HPCOM2	Comment line two Hydrographic Profile	C	78	
HYPROFIL	HPCOM3	Comment line three Hydrographic Profile	C	78	
MAS_CON	PROJECT	Project Which Generated Data	C	15	
MAS_CON	CON_ID	Contact Identification Number	N	10	
MAS_CON	CON_TYPE	Type of Contact: DBA, DL, QAO	C	10	

MCRTXRAW	SAMPLEID	The Carolinian Province Sample identification	C	12 Y1
MCRTXRAW	TOXFILE	Laboratory File name containing detailed test information	C	12 Y2
MCRTXRAW	PROCDURE	procedure used (Basic, Large, Solid, Liquid)	C	6
MCRTXRAW	INITSED	Initial weight of sediment in suspension in grams	N	4.1
MCRTXRAW	INITCONC			
MCRTXRAW	TESTTIME	Test time in minutes	N	3
MCRTXRAW	SLOPE	Slope of the EC 50 Curve	N	7.4
MCRTXRAW	EC50	Concentration at which 50% of the light is attenuated relative to the control	N	5.2
MCRTXRAW	OSMOADJS	Solution used to perform osmotic adjustment	C	8
MCRTXRAW	DILUTFAC	The factor by which eacg subsequent test concentration is diluted		
MCRTXRAW	CONCUNIT	Units of INITCONC		
MCRTXRAW	GAMMA	The ration of the light lost to the light remaining after the reagents are challenged by a sample.	N	5.2
MCRTXRAW	CONFINT	95% Confidence interval about the EC50 $\pm$ value	N	5.2
MCRTXRAW	DOC_FILE	documentation file for additional details about test	C	12 Y2
MCRTXRAW	DOSECURV	A scanned image of the definitive Dose Response Curve used to establish the EC50	Image	
MCRTXRAW	CORECTD	Was sample corrected with reference sediments	C	1
MCRTXRAW	REF_ID	The reference ID used for correction	C	10 Y2
MCRTXSUM	SAMPLEID	The Sampleid	C	10 Y1
MCRTXSUM	STORTEMP	Temperature degrees Cat which the sample was stored	N	4.1
MCRTXSUM	ARIVDATE	Date samples arrived	N	6 Y2
MCRTXSUM	TESTDATE	Date sample was tested	N	6 Y2
MCRTXSUM	TESTDURA	Duration of test in minutes	N	3
MCRTXSUM	EC50	Concentration at which 50% of the light is attenuated relative to the control	N	7.4
MCRTXSUM	ECLOW	Lower Confidence bound for EC50	N	7.4
MCRTXSUM	ECHIGH	Upper Confidence bound for EC50	N	7.4
MCRTXSUM	COEFDTRM	Coefficient of Determination for the regression	N	7.5
PCON_RAW	PCON_ID	Positive control Identification	C	10 Y1
PCON_RAW	REPNUM	Control Replicate Number	N	1 Y1
PCON_RAW	NOMLCONC	Nominal concentration - planned concentration (mg/l or ppm)	N	10.5
PCON_RAW	MEASCONC	Measured concentration (mg/l or ppm)	N	10.5
PCON_RAW	NUM_ANIM	Number of Live Animals at Test Start	N	2
PCON_RAW	NUM_SURV	Number of animals surviving at the end of test	N	2
PCON_RAW	PER_MORT	Percent mortality at the end of the test	N	5.1
PCON_RAW	QACODE	Sediment Toxicity Test QA Code(s)	C	9 Y2
PCON_SUM	PCON_ID	Positive control Identification	C	10 Y1
PCON_SUM	NUMREP	Number of control replicates	N	1
PCON_SUM	LC50	Concentration at which 50% of the animals are killed (mg/l or ppm)	N	7.4
PCON_SUM	CI	Confidence interval about the LC50	N	6.4
PCON_SUM	DURATION	Number of hours test was run (usual 96)	N	3

PCON_SUM	SPECCODE	Sediment Toxicity Test Species Code	C	8	Y2
PCON_SUM	QACODE	Sediment Toxicity Test QA Code(s)	C	9	Y2
PHONBOOK	CON_ID	Contact Identification Number	N	10	
PHONBOOK	CON_WORK	Contact Place of Work	C	40	
PHONBOOK	CON_LAST	Contacts Last Name	C	15	
PHONBOOK	CON_FRST	Contacts First Name	C	10	
PHONBOOK	CON_STRT	Contact Address - Street	C	30	
PHONBOOK	CON_CITY	Contact Address - City	C	20	
PHONBOOK	CON_ST	Contact Address - State	C	15	
PHONBOOK	CON_ZIP	Contact Address - Zip	C	10	
PHONBOOK	PHONUM	Contact Phone Number XXX-XXX-XXXX	C	12	
PHONBOOK	FAXNUM	Contact fax NUMBER XXX-XXX-XXXX	C	12	
PHONBOOK	INETMAIL	Contact INTERNET Address	C	40	
QA_CODES	QACODE	Quality Assurance Code Related to Data	C	6	Y1
QA_CODES	CODDESC1	QA Code Description (#1)	C	40	
QA_CODES	CODDESC2	QA Code Description (#2)	C	40	
QA_CODES	CODDESC3	QA Code Description (#3)	C	40	
QA_CODES	CODDESC4	QA Code Description (#4)	C	40	
SAMPLOG	REC_COND	Condition of Sample when Received	C	80	
SAMPLOG	SAMPLEID	Sample Identification Number	C	12	Y1
SAMPLOG	EVNTNUM	Event Number	N	6	Y2
SAMPLOG	SAMPTYPE	Code for Sample Type	C	3	
SAMPLOG	SHIPNUM	Shipment in which Sample was Sent	C	12	
SAMPLOG	SAMPSTAT	Status of Sample	C	9	
SAMPLOG	EMAPYEAR	Year During Which Data were Collected	N	4	Y1
SEDCNTRW	SPECCODE	Sediment Toxicity Test Species Code	C	8	Y1
SEDCNTRW	EXPTNUM	Experiment Number (YYMMDD)	N	6	Y1
SEDCNTRW	REPNUM	Control Replicate Number	N	1	Y1
SEDCNTRW	NUM_ANIM	Number of Live Animals at Test Start	N	2	
SEDCNTRW	PCMT_CON	Mortality in Control Replicate (%)	N	5.1	
SEDCNTSUM	EXPTNUM	Experiment Number (YYMMDD)	N	6	Y1
SEDCNTSUM	PCON_ID	Positive control Identification	C	10	Y2
SEDCNTSUM	MNPCMT_C	Mean % Mortality-Control Replicates	N	5.2	
SEDCNTSUM	SDPCMT_C	Stand. Dev. of Mean % Mort.-Control Reps	N	6.3	
SEDCNTSUM	NUM_CONS	Number of Control Replicates	N	1	
SEDCNTSUM	SPECCODE	Sediment Toxicity Test Species Code	C	8	Y2
SEDGRABS	EVNTNUM	Event Number	N	6	Y1
SEDGRABS	EVNTDATE	Date of Sampling Event	N	YYMMDD	Y1
SEDGRABS	HOMGRABS	Grabs in Homogenized Sediment Sample (#)	N	2	
SEDGRABS	HOMGFAIL	Unsuccessful Grabs (#)	N	2	

SEDGRABS	SEDCOMM	Comment on Grab Attempts	C	-20	
SEDGRABS	HOMGCC	Total Volume for Chem and Tox Samp (cc)	N	4	
SEDGRABS	EMAPYEAR	Year During Which Data were Collected	N		Y1
SEDTOXRW	SAMPLEID	Sediment Toxicity Sample ID Number	C	12	Y1
SEDTOXRW	SPECCODE	Sediment Toxicity Test Species Code	C	8	Y1
SEDTOXRW	EXPTNUM	Experiment Number (YYMMDD)	N	6	Y2
SEDTOXRW	REPNUM	Field sample replicate number	N	1	Y1
SEDTOXRW	NUM_ANIM	Number of Live Animals at Test Start	N	3	
SEDTOXRW	PCMT_REP	Percent mortality in field sample replicate at day 10	N	5	
SEDTOXRW	QACODE	Quality Assurance Code for Sample	C	9	
SEDTOXSM	SAMPLEID	Sample ID Number Related to Sample Type	N		Y1
SEDTOXSM	PCON_ID	Positive control Identification	C	10	Y2
SEDTOXSM	SPECCODE	Sediment Toxicity Test Species Code	C	8	Y1
SEDTOXSM	EXPTNUM	Experiment Number (YYMMDD)	N	6	Y1
SEDTOXSM	NUM_REPS	Sample Replicates-Summary Data (#)	N	3	
SEDTOXSM	MNPCMT_R	% Mortality-Samp Replicates (Mean)	N	5.1	
SEDTOXSM	SDPCMT_R	% Mortality-Samp Reps (STD of Mean)	N	5.1	
SEDTOXSM	P_VALUE	Probability of Type I error (P Value)	N	6.4	
SEDTOXSM	SIG_CONT	Sig Diff from Control(Samp x % Mortal'y	C	1	
SEDTOXSM	SRVPCCON	% Survival (Samp x as % of Control)	N	5.1	
SEDTOXSM	SIG_BIOL	Mortality is Biologically Signif?	C	1	
SEDTOXSM	DAYSHELD	# days sample held before testing	N		
SEDTOXSM	QACODE	Sediment Toxicity Test QA Code(s)	C	-40	
SEDTOXSM	EMAPYEAR	Year During Which Data were Collected	N		Y1
SILTCLAY	SAMPLEID	Sample ID Number Related to Sample Type	N		Y1
SILTCLAY	MOISTURE	Moisture Content (%)	N		
SILTCLAY	SILTCLAY	Silt-Clay Content (%)	N		
SILTCLAY	SAND	Sand Content (%)	N		
SILTCLAY	EMAPYEAR	Year During Which Data were Collected	N		Y1
SPECLIST	NAME	Taxonomic Name	C	35	
SPECLIST	COMMNAME	Fish Species-Common Name	C	37	
SPECLIST	PHYLUM	Phylum	C	16	
SPECLIST	GROUP	Taxonomic Group	C	15	
SPECLIST	FAMILY	Family	C	20	
SPECLIST	GENUS	Genus	C	20	
SPECLIST	SPECIES	Species	C	20	
SPECLIST	CODBIOST	BioStoret Taxonomic Code	C	17	
SPECLIST	COD_EMAP	EMAP Taxonomic Code	C	8	Y1
STATIONS	STA_AREA	Station's Statistical Area (sq. km)	N	6.1	

STATIONS	STATION	Station Name	C	8 Y1
STATIONS	STA_LATD	Latitude: degrees	N	3
STATIONS	STA_LATM	Latitude: Decimal minutes	N	5.2
STATIONS	STA_LNGD	Longitude: degrees	N	3
STATIONS	STA_LNGM	Longitude: Decimal minutes	N	5.2
STATIONS	STA_SYS	System in which Station is located	C	8
STATIONS	STA_SIZE	Station Size Classification	C	6
STATIONS	STASTATE	State (2 letter postal code)	C	2
STATIONS	STA_HEX	EMAP Hexagon Number	N	12.3
STATIONS	EMAPYEAR	Year During Which Data were Collected	N	4 Y1
TOXWQUAL	TEST_ID	Positive control Identification or SAMPLEID	C	10 Y1
TOXWQUAL	REPNUM	Replicate Number	N	1 Y1
TOXWQUAL	STRTDATE	Date test was started	N	6 Y1
TOXWQUAL	MEASDATE	Date measurements were made	N	6 Y2
TOXWQUAL	DO	Dissolved Oxygen in mg/l	N	5.2
TOXWQUAL	SALINITY	Salinity in Parts per Thousand	N	5.2
TOXWQUAL	pH	pH	N	4.1
TOXWQUAL	TANPLGC	Total Ammonia as Nitrogen in the Pelagic phase in mg/liter	N	6.2
TOXWQUAL	UANPLGC	Unionized Ammonia as Nitrogen in the Pelagic Phase in ug/liter	N	4
TOXWQUAL	TANPORE	Total Ammonia as Nitrogen in the Pore water in mg/liter	N	6.2
TOXWQUAL	UANPORE	Unionized Ammonia as Nitrogen in the Pore Water in ug/liter	N	4